

EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS

DAM AND SEAWALL

REPAIR OR REMOVAL PROGRAM

ANNUAL REVIEW

FISCAL YEAR 2015

DATED 1 SEPTEMBER 2015



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INTRODUCTION

The Dam and Seawall Repair or Removal Program was created by the General Court and signed into law in 2013 under the authority created by M.G.L. c. 29, §2III and regulations issued under 301 CMR 15.00. The program's mission is to promote public health, public safety, and ecological restoration. The legislation was passed in response to growing recognition of the need to address the significant infrastructure issues related to dams and seawalls. A 2011 State Auditor's report identified 100 relatively large dams in unsafe or poor condition with an estimated \$60 million in remediation costs needed to reduce the likelihood of dam failures. A 2007 Coastal Hazards Commission Report and a 2009 Department of Conservation (DCR) Coastal Infrastructure and Assessment Project assessed the coastline, including state and municipally owned structures. The DCR assessment identified over \$626 million in rehabilitation costs.

As described in more detail below, EEA provides funding in the form of grants and loans to finance the costs to rebuild, remove or refinance structures falling into one of the three categories of structures cited in the law: dams or similar unregulated structures; coastal infrastructure; and levees. By executing loans EEA ensures the funds are recycled through repayments of bond principle and interest in order to provide ongoing funding for other projects in future years. The program addresses the growing need to repair dams, coastal flood control structures and inland flood control structures that pose a risk to public health, public safety and key economic centers. Increasing the resiliency of the Commonwealth's infrastructure is a particularly important facet of project selection in the face of increasingly extreme weather impacts. Per Chapter 29, Section 2III, an initial contribution of funds from the Clean Water Trust (aka Clean Water Trust) was transferred to the program, resulting in \$20.1 million credited to a dedicated fund. In accordance with the law, monies in the account were further sub-divided into two equal parts – one part for dam projects, the other for coastal and levee projects.

Eligible applicants vary according to the category of the structure, with the categories defined by the regulations. The primary distinction is that, as authorized by the law, while private dam owners are eligible for funding, they may only receive loans for project costs. As the awards made are from public funds, part of the review process ensures that the public benefit of the project exceeds the private gain received by the private owner. In many cases, the downstream threat to life and property is significant should a privately held dam suffer an unexpected breach. Privately held coastal structures or levees are not eligible for funding.

The actual awards are commonly offered as a finance package of both a grant and a loan. The grant portion is paid as a reimbursement for the final design, permitting, and preparation of the bid package. Construction costs are funded through a loan to the applicant, repayable over a 20-year period. As established in the regulations, the recipients' loan rate of interest over its twenty year life is fixed at the time the award is made, though the available rate is reviewed and adjusted according to market conditions with each application period. During fiscal year 2014, most loans were set at a rate of 2 percent which compares favorably with current market rates to municipal borrowers of approximately 2.90¹ percent. A private structure owner would receive this same advantageous rate if funded.

¹ http://www.fmsbonds.com/market_yields/index.asp As of 12 June 2015 – AAA rating.

² During contract negotiations, the City of Attleboro decided to finance its construction costs without assistance from the Dam

Applicants are encouraged to consider that many structures were built for a different time and purpose. Today the useful purpose of the structure may have passed. In the development of the regulations, it was noted that ecological restoration was also a priority of the legislation. To that end, the regulations permit the loan rate to be established at 0% should the completion of the project improve/expand use of naturally occurring systems. This creates a financial incentive for applicants to consider not only the costs of reconstruction, but also the longer term ongoing operations and maintenance costs. When all factors are considered, removal of the structure may be very cost competitive. Often the better financial option is also the better ecological choice.

REVIEW OF ROUND TWO APPLICATIONS

APPLICATIONS ACCEPTED: In the closing days of fiscal year 2014, applications were received by EEA for funding the second round of awards. Relying upon an interagency team formed when the regulations were first developed, EEA convened a group of professionals to assist with the review of applications. Representatives from DCR's Office of Dam Safety, DCR's Office of Waterways, DFG's Division of Ecological Restoration, and EEA's Office of Coastal Zone Management assisted EEA in reviewing proposals and advising the Dam and Seawall Program Administrator in making funding recommendations to the Secretary.

Twenty six responses from across the Commonwealth were received in this second application round. This included eighteen Category 1 (Dams and similar unregulated structures) proposals requesting a total of \$12,447,900 and leveraging an additional \$3,270,913 in local and federal funds. Eight Category 2 (coastal infrastructure) proposals were received, requesting \$22,259,667.50 and leveraging an additional \$149,881.42. There were no requests under Category 3 (Levees).

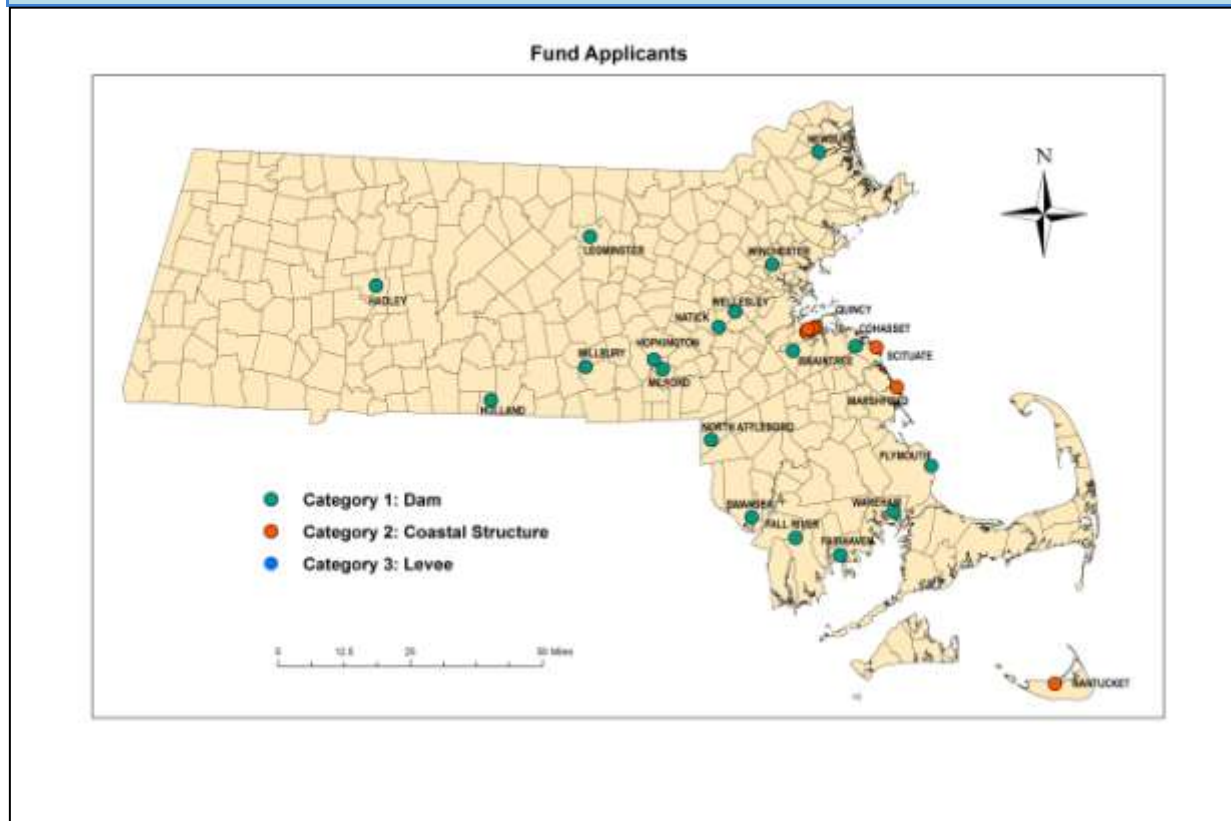
All in all, this second round of requests sought over \$34.7 million, amounting to 140% of the total original authorization deposited in the Fund account at its inception in 2014.



and Seawall Fund, allowing EEA to extend a \$1,000,000 award to the City of Fall River for the repair of the Copicut Dam. This award was not part of the original announcement on September 26.

| Application Category | Applications Received | Funds Requested | Matching Funds Offered (cash and/or in-kind) |
|--|-----------------------|------------------------|--|
| Category 1: Dams and similar unregulated | 18 | \$12,447,900.00 | \$3,270,913.00 |
| Category 2: Coastal | 23 | \$22,259,667.50 | \$149,881.42 |
| Category 3: Levees and similar | 0 | \$0.00 | \$0.00 |
| Total | 41 | \$34,707,567.50 | \$3,420,794.42 |

Table 1: Summary of FY 2015 Applications Received



AWARDS ANNOUNCED: On 26 September 2014 representatives from many of Massachusetts' municipalities gathered in Scituate for the announcement of the second round of awards. EEA announced that \$13,200,000 would be made available to a number of communities for critical projects. The funds offered would again come from two sources. In addition to the Dam and Seawall Repair or Removal Fund, supplemental funding would also be allocated from the Environmental Bond.



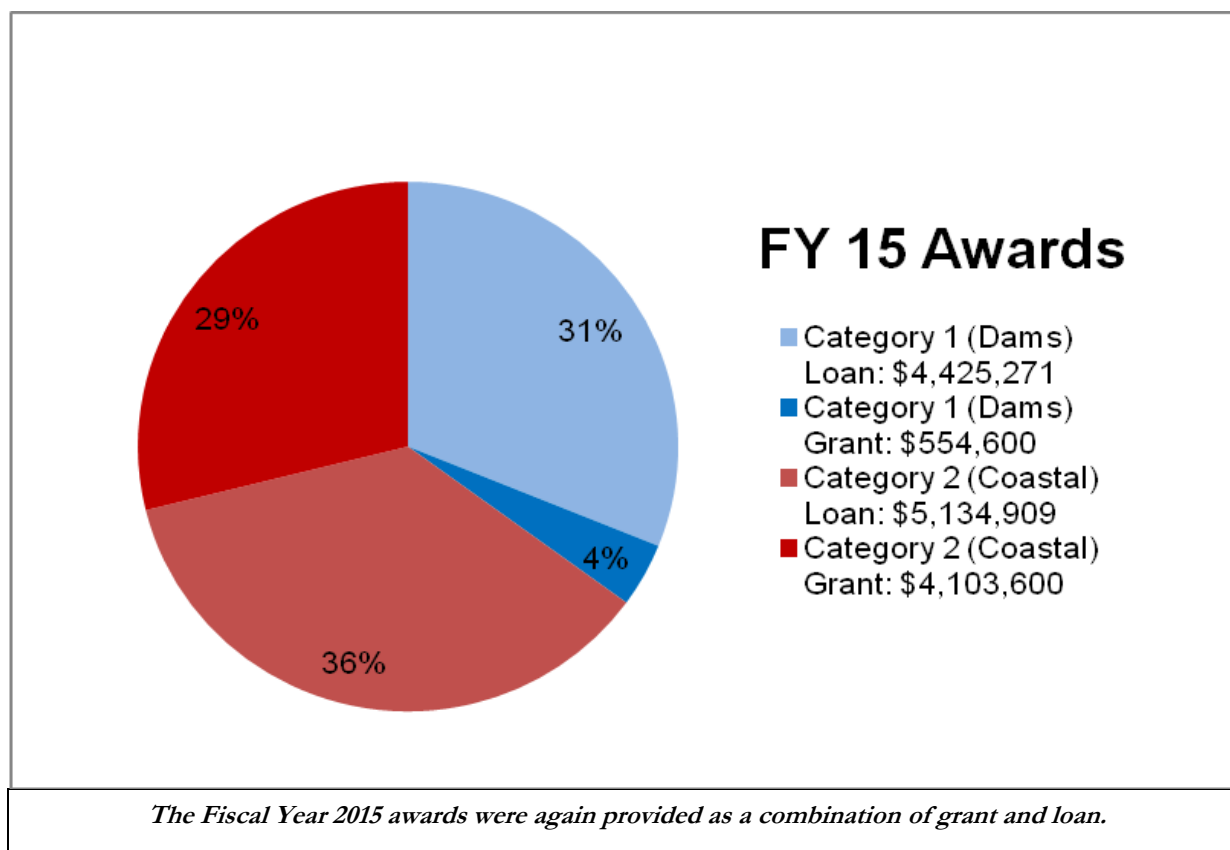
Over 50 state and local officials gathered in Scituate for the announcement of the FY 2015 awards

| Applicant | Project | Total Award | Award Structure | | Matching Funds | Project Summary |
|------------|---------------------------|-------------|-----------------|-------------|----------------|---|
| | | | Grant | Loan | | |
| Marshfield | Foster Avenue Seawall | \$3,946,200 | \$1,950,000 | \$1,946,200 | \$90,900.00 | 1000 feet of structure will be replaced from Old Beach Road to Ninth Road. Originally constructed in the 1930's, this project will help increase Marshfield's resilience to coastal storm events and increase public safety. |
| Nantucket | Easy Street Bulkhead | \$1,342,309 | \$153,600 | \$1,188,709 | \$58,981.42 | A steel bulkhead will be installed in front of the existing failed wooden bulkhead to protect Nantucket's Easy Street. The heart of Nantucket's downtown, Easy Street is a critical transportation route for all goods and services going to and from the Steamship Authority terminal (located at lower Broad Street) as well as for first responders. |
| Scituate | Oceanside Drive Seawall | \$4,000,000 | \$2,000,000 | \$2,000,000 | \$2,400,000 | A ±650 linear foot section of the existing Oceanside Drive seawall will be reconstructed. The structure provides protection to public roads and associated utilities and allows public access to the beach. During major storm events, Oceanside Drive often floods and becomes inundated with overwash consisting of large cobbles and sand, preventing access for first responders working to ensure public safety. |
| Attleboro | Hoppin Hill Reservoir Dam | \$1,000,000 | \$160,000 | \$840,000 | \$100,000 | Hoppin Hill Reservoir Dam will be reconstructed to ensure public safety downstream and to maintain reservoir integrity. Originally constructed circa 1910 and rehabilitated in 1987, this 1100 foot structure is a critical part of the city's infrastructure, protecting its water supply as well as providing for passive recreation around the reservoir. |

Table 2: Summary of Funds Awarded – FY 2015

| Applicant | Project | Total Award | Award Structure | | Matching Funds | Project Summary |
|--|--------------------------------|--------------|-----------------|-------------|----------------|--|
| | | | Grant | Loan | | |
| Cohasset | Bound Brook Dam | \$1,000,000 | \$158,000 | \$842,000 | \$421,200 | Bound Brook dam will be repaired. This dam helps control the water storage levels of Lily Pond, Cohasset's primary water supply reservoir. It also protects Beechwood Street., located on the crest of the dam, Beechwood is heavily traveled, connecting the southern portions of Cohasset with the surrounding towns of Scituate, Norwell and Hingham. |
| Leominster | Morse Reservoir Dam | \$1,000,000 | \$37,400 | \$962,600 | \$708,000 | This rehabilitation will address three areas of significant seepage along the toe of the dam, resulting in an estimated loss of approximately 50 gallons per minute from the City's water supply. A failure of this dam could result in the destruction of Elm Street, several downstream neighborhoods and threaten the Distributing Reservoir Dam and Water Treatment Plant. |
| Tri-Town Water District (Braintree, Holbrook, Randolph) | Great Pond Lower Reservoir Dam | \$979,871 | \$165,200 | \$814,671 | \$291,200 | The Great Pond Lower Reservoir Dam spillway and surrounding earthen dam area will be rehabilitated. As well, fish passage will be installed to help restore migration to the region. |
| Fall River ² | Copicut Dam | \$1,000,000 | \$34,000 | \$966,000 | \$67,068 | These funds would assist in the reconstruction of the Copicut Reservoir Dam which impounds water solely for the 100,000 drinking water customers of the City. |
| Total | | \$14,200,000 | \$4,658,200 | \$9,560,130 | \$4,137,349.42 | |
| Table 2: Summary of Funds Awarded – FY 2015 (continued) | | | | | | |

² During contract negotiations, the City of Attleboro decided to finance its construction costs without assistance from the Dam and Seawall Fund, allowing EEA to extend a \$1,000,000 award to the City of Fall River for the repair of the Copicut Dam. This award was not part of the original announcement on September 26.



RELEASE OF ROUND THREE RFQ

On 13 May 2015 the application documents for the third round were released to the public through CommBUYS and the EEA's website³. The application period will close on 14 July 2015. This Request for Quotes could not have been released without the commitment of Secretary Beaton and the Baker-Polito Administration for further financial support of the program through the Environmental Bond.

³ <http://www.mass.gov/eea/waste-mgmt-recycling/water-resources/preserving-water-resources/water-laws-and-policies/water-laws/draft-regs-re-dam-and-sea-wall-repair-or-removal-fund.html>

CURRENT STATUS OF ALL PROJECTS

As of 30 June 2015, total funds under management in the program totaled \$31,938,848. Over two award periods, funding has been offered to twenty five municipalities for work on twenty three separate projects⁴. The finance packages have offered \$13,919,553 in grants and \$13,102,622 in loans. All but 3 of the contracts offered to communities have been executed. Four loans, backed by general obligation bonds of the individual communities, have been executed:

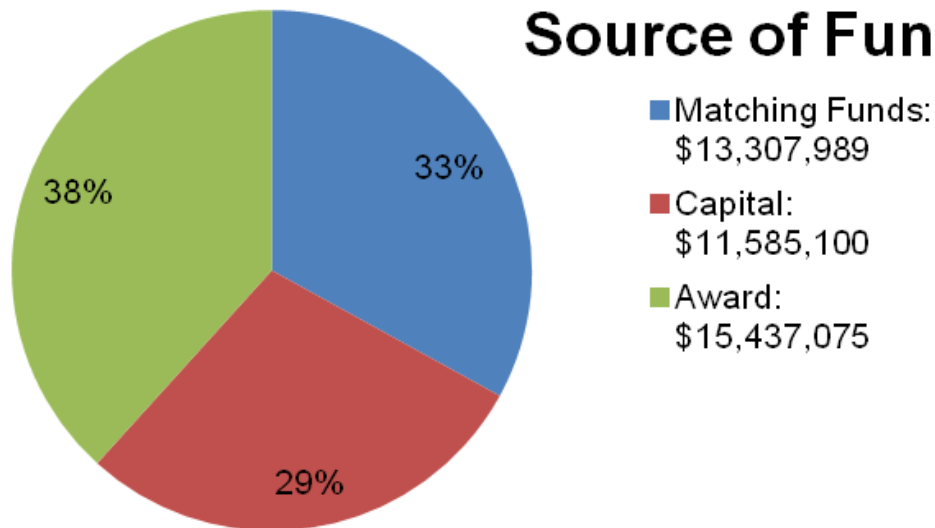
| Borrower | Loan Amount | Rate of Interest | Bond Date | Bond Maturity |
|---------------------------|--------------|------------------|--------------|---------------|
| Town of Lancaster | \$116,000. | 0% | 20 May 2014 | 15 June 2034 |
| City of Westfield | \$1,000,000. | 2% | 26 June 2014 | 26 June 2034 |
| Town of Plymouth | \$740,743. | 0% | 24 June 2015 | 24 June 2035 |
| Town of Brookfield | \$173,199. | 2% | 24 June 2015 | 24 June 2035 |
| Table 3: Summary of Loans | | | | |

During fiscal year 2015, \$46,915.75 in loan principle repayments were made to the Fund, with an additional \$19,239.88 in interest credited. In accordance with the regulations providing the provisions for the administration of the Dam and Sea Wall Repair or Removal Fund, this interest will be allocated evenly between the two subaccounts (see **IMPLEMENTATION**, page 1).

Of the initial \$20.1 million allocated by the Massachusetts Legislature to the Fund, there is only \$340,743.90 remaining for Category 1 projects and \$5,100,084.94 for Category 2 and Category 3 projects. This takes into account unawarded monies, principal repayments to date, and interest paid on loans to date.

⁴ The Great Pond Lower Reservoir Dam is co-managed by the three communities of the Tri-Town Water District.

Source of Funding



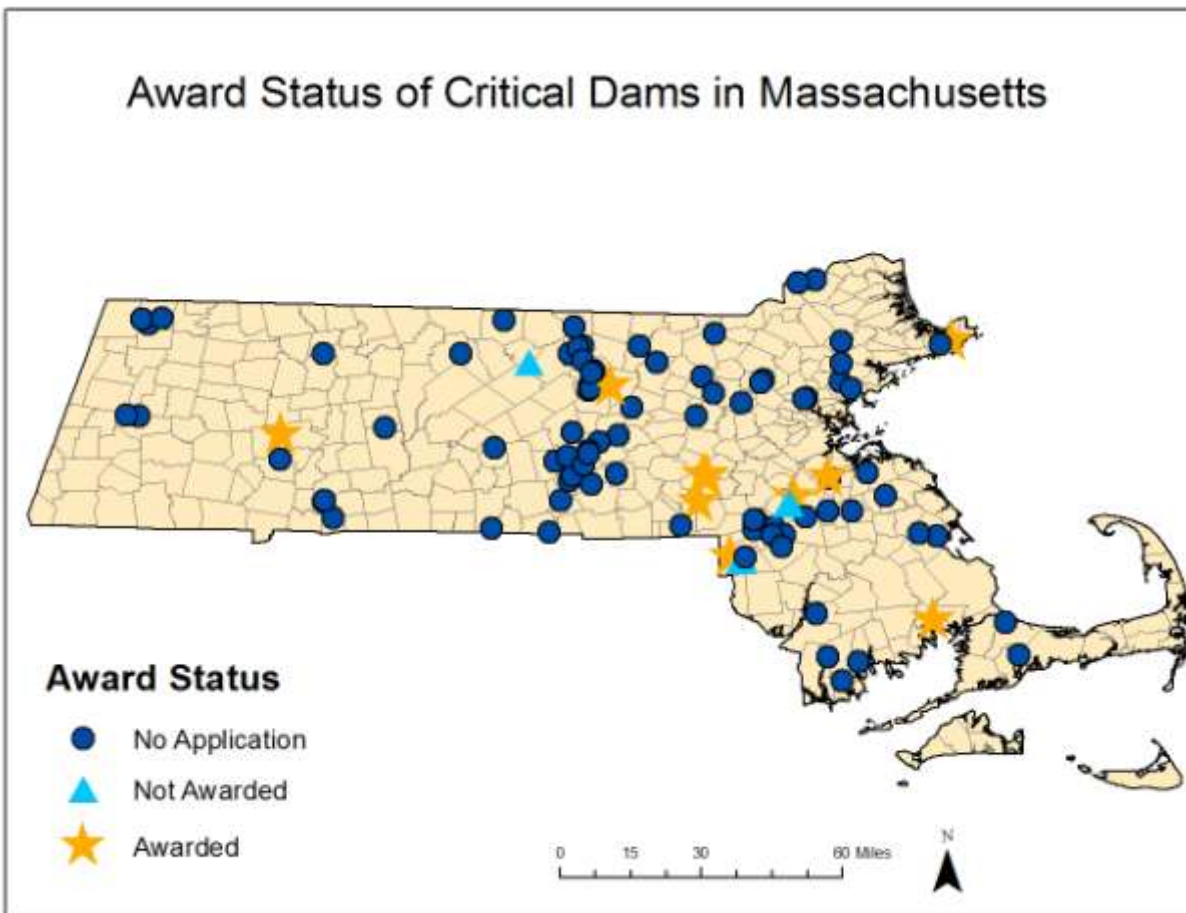
The ability for the program to successfully fund critical infrastructure projects is due to the integration of funds from a variety of sources, including the Dam and Seawall Fund, the Commonwealth's Capital Budget, and matching funds secured by the communities from local and federal sources.

On 19 June the Baker-Polito Administration released their Capital Budget Plan for fiscal year 2016⁵. Recognizing the importance of improving the protection of essential public infrastructure including public utility and emergency response infrastructure, over \$6 million is anticipated to supplement the awards made from the Fund during fiscal year 2016.

Since the program was created in early 2014, applications for 87 structures totaling over \$104 million have been reviewed by EEA and the interagency team. While there are many valuable projects underway, there are limitations in our ability to address the Commonwealth's needs. The volume of applications alone, and the funds sought through those applications, identifies an inability to meet the demand made upon the program by applicants. Further, independent studies on dams and coastal infrastructure have verified a need far beyond what the program can currently support.

⁵ <http://www.mass.gov/bb/cap/fy2016/rec/hdefault.htm>

In 2011, for example, the Auditor of the Commonwealth evaluated the need for the repair of the 100 municipally owned dams in the Commonwealth in the most critical condition at \$60,000,000⁶. To date, only fifteen of these 100 structures have submitted applications to EEA. Ten of those structures have been addressed through the fund. A recent survey of news accounts indicate an additional 24 structures have been addressed by the municipal owners with funds from other sources.



In 2009, DCR's Office of Waterways published the Massachusetts Coastal Infrastructure and Assessment Project, citing a financial need of \$626,798,185 (in 2006 dollars) to bring existing coastal structures back to compliance with their original design. "Based on the proposed spending plan, approximately \$31.5 million will be needed each year to meet the 20-year repair plan."⁷ This estimate did not take into account any recommended additional fortification considered important given current projections regarding the impact

⁶ Local Impact Financial Review: Massachusetts Dam Safety Law. Auditor of the Commonwealth, 2011.
<http://www.mass.gov/auditor/docs/dlm-municipal/dlmdamsafetyreport.pdf>

⁷ Massachusetts Coastal Infrastructure and Assessment Project. Department of Conservation and Recreation, 2009.
<http://www.mass.gov/eea/docs/czm/stormsmart/seawalls/public-inventory-report-2009.pdf>

of climate change. As Massachusetts is home to a significant coastal population, public health, utilities and emergency response access issues will only increase over time as seas rise and storm intensity increases.

The Dam and Seawall Repair or Removal Program continues to demonstrate its ability to serve the Commonwealth in a number of ways, primarily:

- addressing needs to repair structures where failure would likely cause loss of life and/or serious damage – especially structures vital to the protection of essential public infrastructure, commercial and population centers, protection of tax revenue generating structures and infrastructure necessary for the supply and delivery of public utilities and emergency response activities;
- providing a source of funding to remove those structures whose useful purpose has passed;
- offering incentives to remove obsolete structures, and thereby improving or expanding the functions of naturally occurring systems;



INDICATIVE SUMMARIES

Below find summaries of each project funded, as well as updates on projects previously funded through the program.

Indicative Project Summaries

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Applicant: City of Attleboro
Project Title: Hoppin Hill Reservoir Dam Rehabilitation
Location: Hoppin Hill Reservoir, North Attleboro MA
Repair or Removal: Repair

Description: Hoppin Hill Reservoir Dam is a HIGH hazard earth embankment dam impounding Hoppin Hill Reservoir. The dam and reservoir are owned by the City of Attleboro and located in the Town of North Attleboro. Hoppin Hill Reservoir is an important component of the City's water supply system. In addition, the dam and area surrounding the reservoir are accessible by the public for passive recreation.

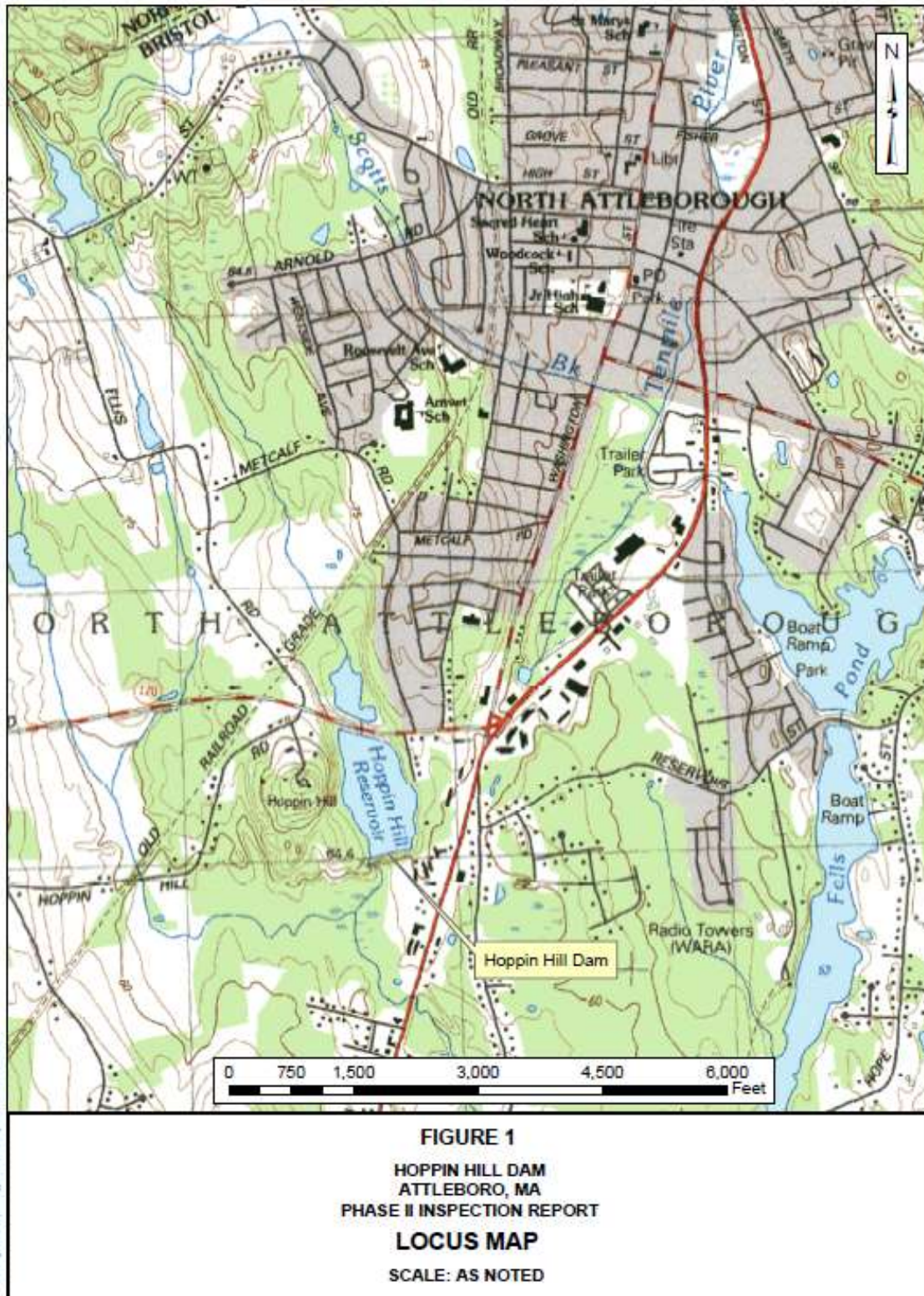
The Dam is an approximately 1,100-ft. long curved earthen embankment with a reported maximum structural height of 23-ft. and hydraulic height of 20-ft. The dam was originally constructed circa 1910 and rehabilitated in 1987. The rehabilitation included replacing the upper sluice gate system, replacing the valve for the aerator basin bypass, tree removal in embankment area, and replacing and repairing deteriorated concrete facing on the upstream slope. The dam was initially rated in POOR condition based on a 2008 dam safety inspection. DCR issued a Certificate of Non-Compliance and Dam Safety Order in 2009.

Subject to final design, the following rehabilitation measures are anticipated to bring the Hoppin Hill Reservoir Dam into compliance with Chapter 253 Section 44-48 and 302 CMR 10.00 Dam Safety Regulations and current dam safety practices, including: 1) Spillway Improvements; 2) Upstream Face/Slope Improvements; 3) Downstream Slope Improvements; 4) Crest Improvements; and 5) Improvements to the Instrumentation.

As reconstruction is completed, an Operations and Maintenance Plan as well as Emergency Action Plan will be developed and submitted to DCR - ODS for review and approval. As part of the Operations and Maintenance Plan for the rehabilitated dam, a phreatic surface monitoring program based on piezometer measurements will be included.

A notice to proceed was issued on 13 January 2015. The City chose to accept the grant portion only, agreeing to borrow funds on its own to ensure completion of all construction tasks. This agreement was negotiated into their contract.

Project Cost: \$1,105,285
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$160,000 in grant
Other Funding: \$945,285 City of Attleboro
Anticipated Project Completion: November 2016



Applicant: Town of Cohasset
Project Title: Bound Brook Control Dam Rehabilitation
Location: Beechwood Street, Cohasset MA
Repair or Removal: Repair

Description: The Bound Brook Control Dam impounds Bound Brook and Lily Pond. The Dam and its inlet control structure regulate the water level of Lily Pond, the primary drinking water reservoir for the Town of Cohasset and parts of the Town of Hingham. Beechwood Street, a heavily traveled and regionally important highway passes over the crest of the Dam and connects southern portions of Cohasset to the surrounding towns of Scituate, Norwell, Hanover and Hingham around the Wompatuck State Park. Bound Brook flows into the Gulf of Scituate and Cohasset Harbor. The brook serves as a natural fish habitat for herring and other migratory species. A fish ladder constructed circa 1976 serves as an integral component of the Dam.

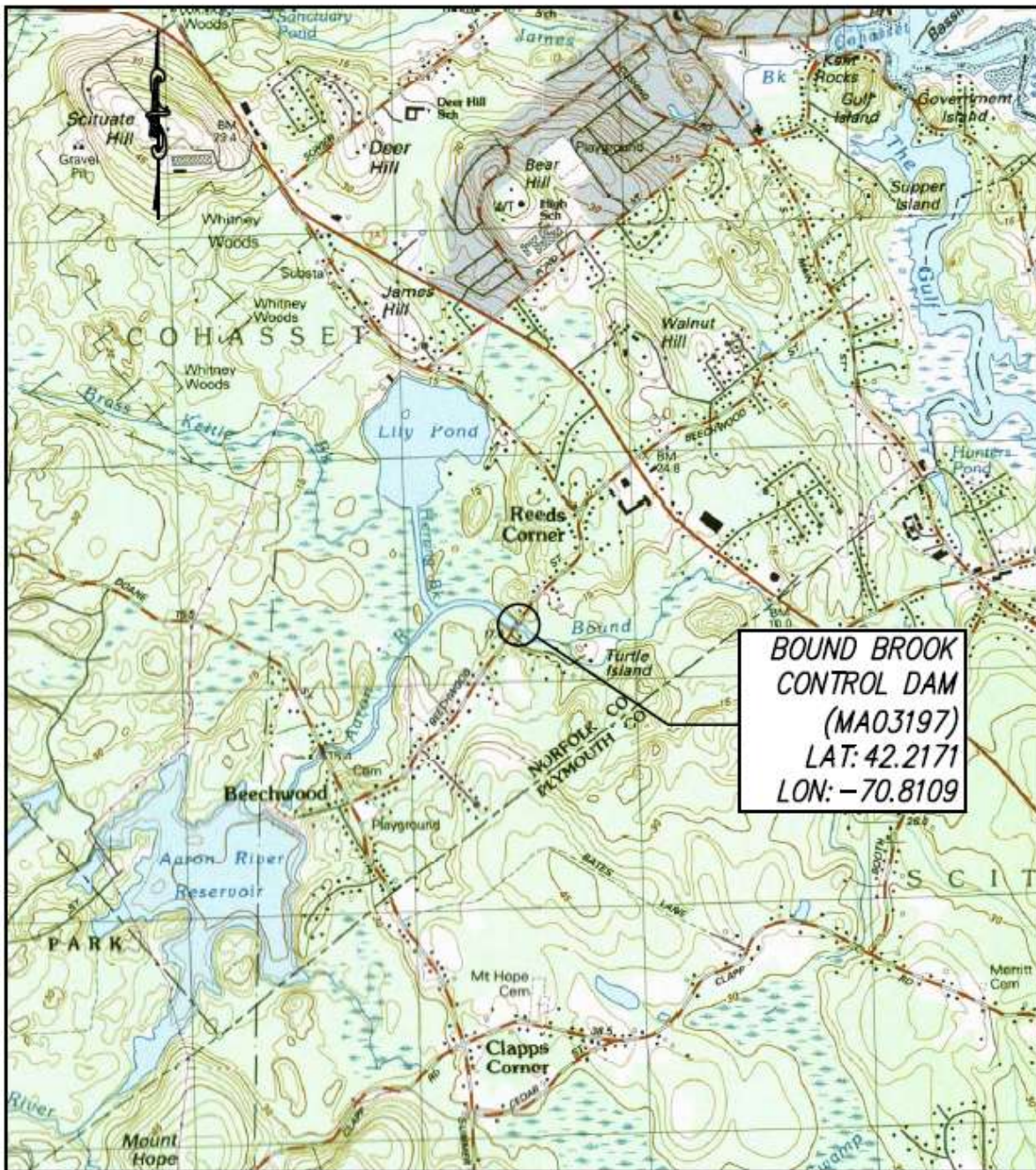
The dam is a 200 foot long by 42 foot wide earthen embankment dam with a structural height of approximately 11 feet. Twin culverts convey Bound Brook through the Dam. Inlet control structures located at the entrance of each culvert regulate flow into the culverts. The fish ladder is located between the inlet control structures. The Dam is classified as an Intermediate Sized Dam with Significant Hazard Potential. Recent studies by engineering consultants indicate the Dam is Structurally Deficient and in Poor Condition.

The Town will: 1) replace the twin culverts with a precast concrete box culvert or culverts; 2) preserve of the inlet control structures and fish ladder; 3) remove trees and brush on the upstream and downstream slopes; 4) provide additional riprap slope protection where erosion and/or the slopes are excessively steep below the observed high water level; 5) regrade slopes (to decrease pitch) and promote grass growth on the slopes above the riprap; 6) fill erosion holes behind the upstream culvert headwall with compacted granular soil fill; 7) ensure that the release schedule, release amounts, and required flow regimes of the control structure are reviewed and adjusted to ensure continued compliance with the Water Management Act permit of the Massachusetts Department of Environmental Protection.

In addition, the dam crest will be improved including maintaining the existing water and gas main crossings, adding pipe sleeves for future sewer main and fiber optic crossings, and improving drainage for environmental and resource protection improvements using stormwater policy best management practices.

A contract was executed in June 2015 with an effective date in July 2015. Work will begin in the fall of 2015.

Project Cost: \$1,421,200
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$158,000 in grant
\$842,000 in loan
Other Funding: \$421,200 Town of Cohasset
Anticipated Project Completion: June 2017



Source:
USGS TOPOGRAPHIC MAP
COHASSET, MA
QUADRANGLE



Lenard Engineering, Inc.
Auburn, MA

FIGURE 1 - LOCUS PLAN

State ID# 7-11-65-3 NID# MA03197

BOUND BROOK DAM REPAIRS

COHASSET, MA

Scale 1"= 2000'

Applicant: City of Fall River
Project Title: Copicut Dam Repair
Location: Fall River, MA
Repair or Removal: Repair

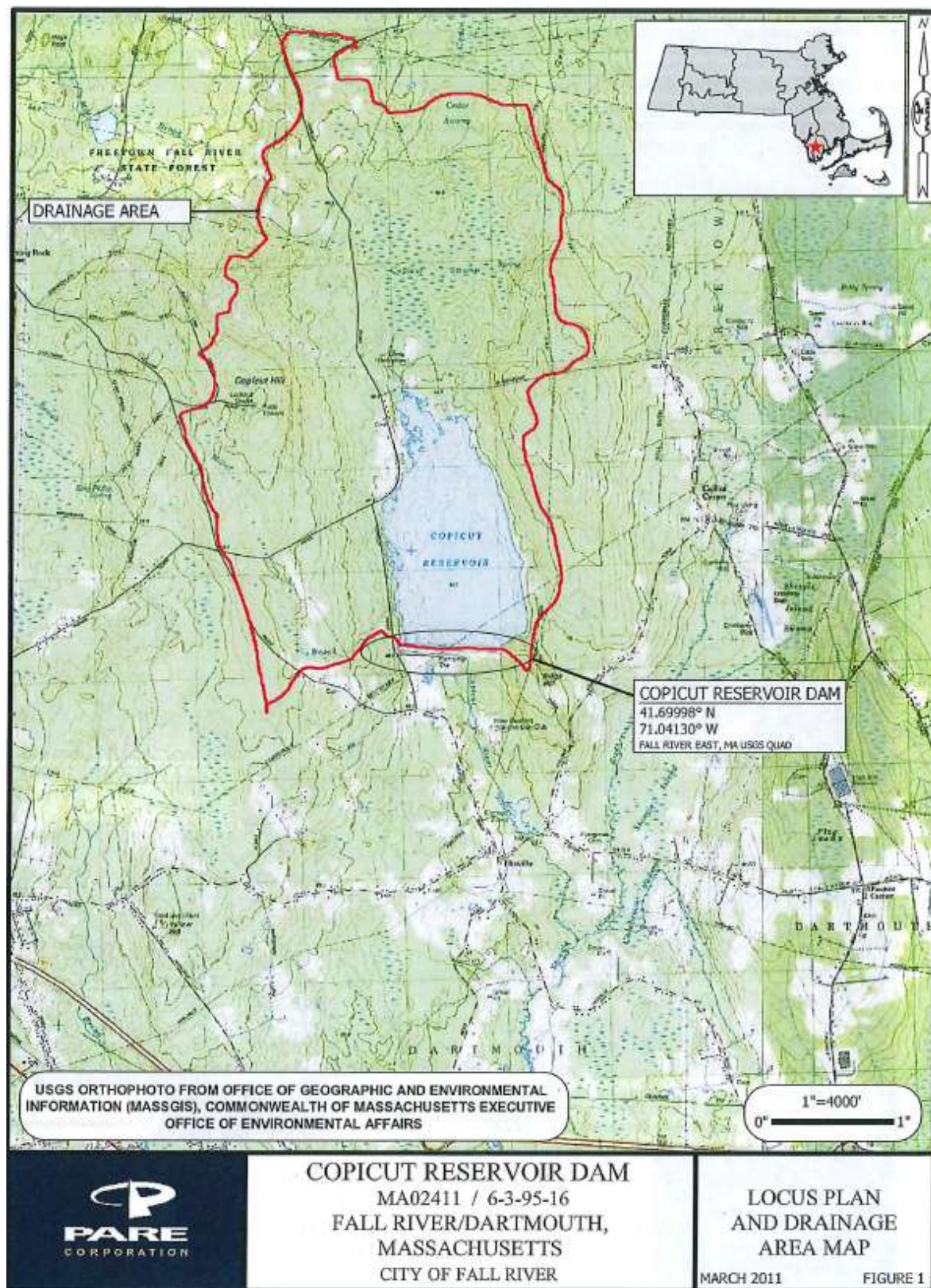
Description: The Copicut Reservoir Dam impounds water solely for drinking water supply purposes. EEA is providing financial assistance to the City of Fall River for repairs to the Copicut Reservoir Dam through grant funding for project preparation and then a construction loan. The project will reduce risk to public safety, infrastructure and areas of environmental concern by addressing documented structural deficiencies that could result in failure. The objective is to bring the Copicut Reservoir Dam into compliance with Department of Conservation and Recreation Office of Dam Safety (DCR - ODS) standards and regulations.

Project Plan: The project's primary objective will be to make necessary repairs to the Copicut Reservoir Dam to improve the dam's safety and integrity in order to increase public safety and protect public infrastructure. To accomplish this goal, we will complete the following activities, which were recommended in the inspection/evaluation report completed by Pare Corporation in March 2011, to mitigate common causes of dam instability and possible failure.

At a minimum, the project tasks will include the removal and/or relocation of concrete barriers to improve access for regular clearing of vegetation/brush off face of dam; clearing the embankment and walls of all vegetation, including brush and trees (significant root systems will be pulled and the resulting holes properly filled and grassed as well as trees and stumps with diameters in excess of 6 inches to be cut, the root systems grubbed from the embankment, and the resulting holes promptly filled with suitable compacted material); repair of eroded sections of the upstream slope to reestablish the original profile including riprap to prevent additional erosion; removal of all rodents from the dam and properly backfill all animal burrows; clearing of brush and trees from the spillway discharge channel; patch any holes found in the left training wall; and regrade rutting and undulations along the crest to provide a uniform top of dam elevation. Loam and seed the dam crest or provide an erosion resistant roadway such as dense grade crushed stone.



Project Cost: \$1,067,058
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$ 34,000 in grant
\$ 966,000 in loan
Other Funding: \$ 67,058 from the City of Fall River
Anticipated Project Completion: May 2017



Applicant: City of Leominster
Project Title: Morse Reservoir Dam Rehabilitation
Location: Morse Reservoir, Leominster MA
Repair or Removal: Repair

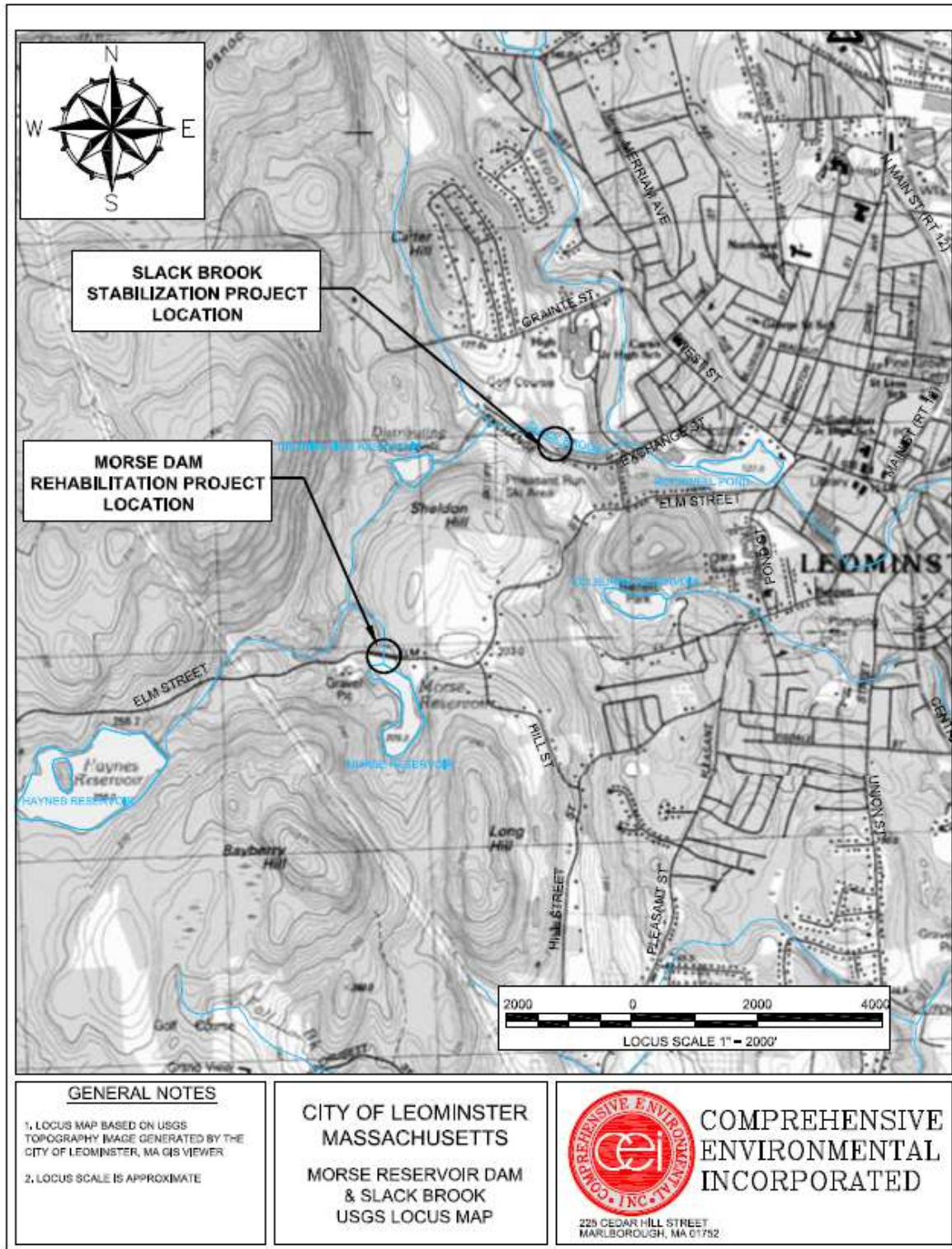
Description: The Morse Reservoir Dam is currently listed as a **Significant Hazard** dam in **Fair Condition** and is therefore considered a priority safety concern. State of Massachusetts Department of Environmental Protection (DEP) has mandated the repair of the dam as part of its most recent sanitary survey. It is a water supply dam located along Elm Street northern edge of Morse Reservoir, in an unnamed tributary of the Monoosnoc Brook of the Nashua River Basin in Leominster Worcester County, Massachusetts. It is approximately 25-foot high, 475-foot long earthen embankment dam. Elm Street is a paved local roadway that traverses the top of the dam. There is one low level outlet at the dam that consists of a 14-inch diameter cast iron pipe located at a stone masonry headwall at the downstream toe of the dam at its centerline. Dam Inspection Reports dating from the late 1990's have identified similar major issues which need to be addressed.

The plan includes proposed spillway improvements, including the removal of accumulated debris and vegetation to re-establish the estimated spillway capacity of 400 cfs which will meet the **500-yr storm event and provide enhanced dam resiliency**. The proposed gate house / outlet works improvements will also improve dam resiliency and increase safety by improving hydraulic capacity and providing protection from potential storm damage and future deterioration of the outlet controls.

To address the above deficiencies, the major retrofits are proposed to the dam and surrounding area including 1) installation of a cut-off wall consisting of an impervious sheet pile cut-off wall in the center of the dam, that extends from the top of the dam down to the hard glacial till interface to prevent seepage through the dam; 2) regrading of the downstream slope from a 1.5H:1V to a 3H:1V slope to improve slope stability and factor of safety criteria; 3) clear woody vegetation from within the spillway and modify as needed to meet the required design storm and maintain required freeboard; and 4) repair, replace or retrofit the low level outlet valve at the 100 year old gate house. The proposed design will address climate change and the increased 100 year storm flows based on newly available NRCS Extreme Precipitation Data.

As of June 2015 the contract has not been executed.

Project Cost: \$1,708,161
Funds Requested from EEA: \$1,000,000
Funds Awarded \$37,400 in grant
 \$962,600 in loan
Other Funding: \$708,161 City of Leominster
Anticipated Project Completion: July 2016



Applicant: Town of Marshfield
Project Title: Foster Avenue Seawall – Phase 1
Location: Marshfield, MA
Repair or Removal: Repair

Description: The project area is located in the Fieldston section of Marshfield. The Foster Avenue Seawall begins at the public access located at Old Beach Road and extends southward for 2,800 feet to the public access located at Brook Street. An additional 650 feet extends southward from Brook Street. In addition to protecting publicly owned infrastructure, tax generating properties and valuable natural resources, this seawall also provides public access to the beach through five concrete stairways. Reconstruction of these stairways is included in this project and will provide safe public access to the beach and other waterfront activities.

This section of the Foster Avenue Seawall is assigned a Condition Rating of D – Poor, and a Priority Rating of IV - High Priority. Ongoing maintenance and repairs is becoming difficult and less cost effective each year due to the advanced deterioration exhibited by this 80 year old structure.

EEA will support design and permitting services for the reconstruction of the northern portion of the Foster Avenue Seawall and construction of approximately half of the designed and permitted work. The construction phase of the *Foster Avenue Seawall - Phase I* project will consist of reconstructing the northern most 1,000 feet of seawall located between the Old Beach Road access ramp and 9th Road. Three public access stairways are located in this segment and will also be reconstructed.

The proposed project includes groin refurbishment and or a revetment at the base of the seawall in an attempt to minimize scour effects caused by the action of waves upon the seawall. Further, in order to address potential impacts resulting from climate change, the foundation and seawall height design should ensure suitable protection for an anticipated 2 foot sea level rise. Prior to the execution of the contract, the Town shall secure legal documentation from each property owner affected by the construction phase of the project ensuring a 10-foot wide access channel on either side of the foot and/or toe seawall, whichever provides the greatest access, as designed for reconstruction as well as ongoing maintenance and upkeep.

Access issues were resolved by eminent domain in May and the contract was signed in mid-June. Final design and permit work will be completed during 2015 with the construction efforts anticipated for spring 2016.

Project Cost: \$3,946,200
Funds Requested from EEA: \$3,852,000
Funds Awarded: \$1,973,100 in grant
 \$1,973,100 in loan
Other Funding: \$94,200 Town of Marshfield
Anticipated Project Completion: November 2017



Applicant: Town of Nantucket
Project Title: Easy Street Bulkhead
Location: Nantucket, MA
Repair or Removal: Repair

Description: Located in the downtown area of the Town of Nantucket, Easy Street is the critical- primary public transportation route for all goods and services in transport to the Steamship Authority terminal on lower Broad Street. It is from this terminal that over 85% of the island's goods and 100% of the vehicles are transported to and from the island.

The bulkhead abuts the east face the sidewalk and the roadway along Nantucket Harbor. The bulkhead has failed at the mud line. When there is excessive wave action and a plus tide event, the bulkhead is undermined and overtopped with damaging wave action. This flooding situation causes severe public health and safety issues by flooding behind the bulkhead, over the road, forcing the closure of the road and the causing brick walkway to collapse.

- Complete reconstruction will eliminate continuous repairs after every major storm event. It will also stabilize the handicap, public access sidewalk and the critical transportation route to the Steamship Authority Terminal.
- Replacement of the failed bulkhead will eliminate the sand transport from the undermining side walk and roadway. This sand is filling in the recreational boating mooring field located in Easy Street Basin.
- The installation of a sheet steel bulkhead in front of the existing failed wooden bulkhead will eliminate flooding of the numerous commercial and residential properties behind (west) of the bulkhead.
- The new bulkhead will protect the proper re-installation of the handicap, public access side walk on this vital downtown location.
- Climate change will be addressed by increasing the overall bulkhead height by 2 feet. The additional 2 feet of elevation will eliminate the storm tide and wave wash over that contributes to the flooding making the road impassable.
- The addition of a flow cap on the second storm drain outfall will eliminate flooding when there is a plus tide.

As of June 2015 the contract had just been signed by the town and prepared for execution by EEA in July, beginning of fiscal year 2016.

Project Cost: \$1,381,306
Funds Requested from EEA: \$1,342,309
Funds Awarded: \$ 153,600 in grant
\$1,188,709 in loan
Other Funding: \$38,997 Town of Nantucket
Anticipated Project Completion: Fall 2016



Applicant: Town of Scituate
Project Title: Oceanside Drive Seawall Rehabilitation
Location: Scituate, MA
Repair or Removal: Repair

Description: The project is located in the Town of Scituate and extends along the shoreline of Oceanside Drive by the cross streets of Tenth and Eleventh Avenue. The structure consists of a ± 650 linear foot (LF) section of the existing Oceanside Drive seawall, which in its entirety, is comprised of a concrete seawall and stone revetment that extends approximately 1.2 miles from Lighthouse Point to First Avenue. The existing structure provides protection to public roads and associated utilities as well as to dozens of privately-owned shoreline and nearby properties. Public access to the beach is currently provided by a concrete ramp that is located approximately 200 feet south of Eleventh Avenue. Records indicate the Oceanside Drive seawall was originally constructed in 1933 by the State as authorized under Chapter 286 of the Acts of 1933. Since that time, repairs efforts have been implemented periodically by the Town and State. The structure was reported to be in fair condition (C) in 2007, and it was most recently downgraded to poor condition (D) in 2013.

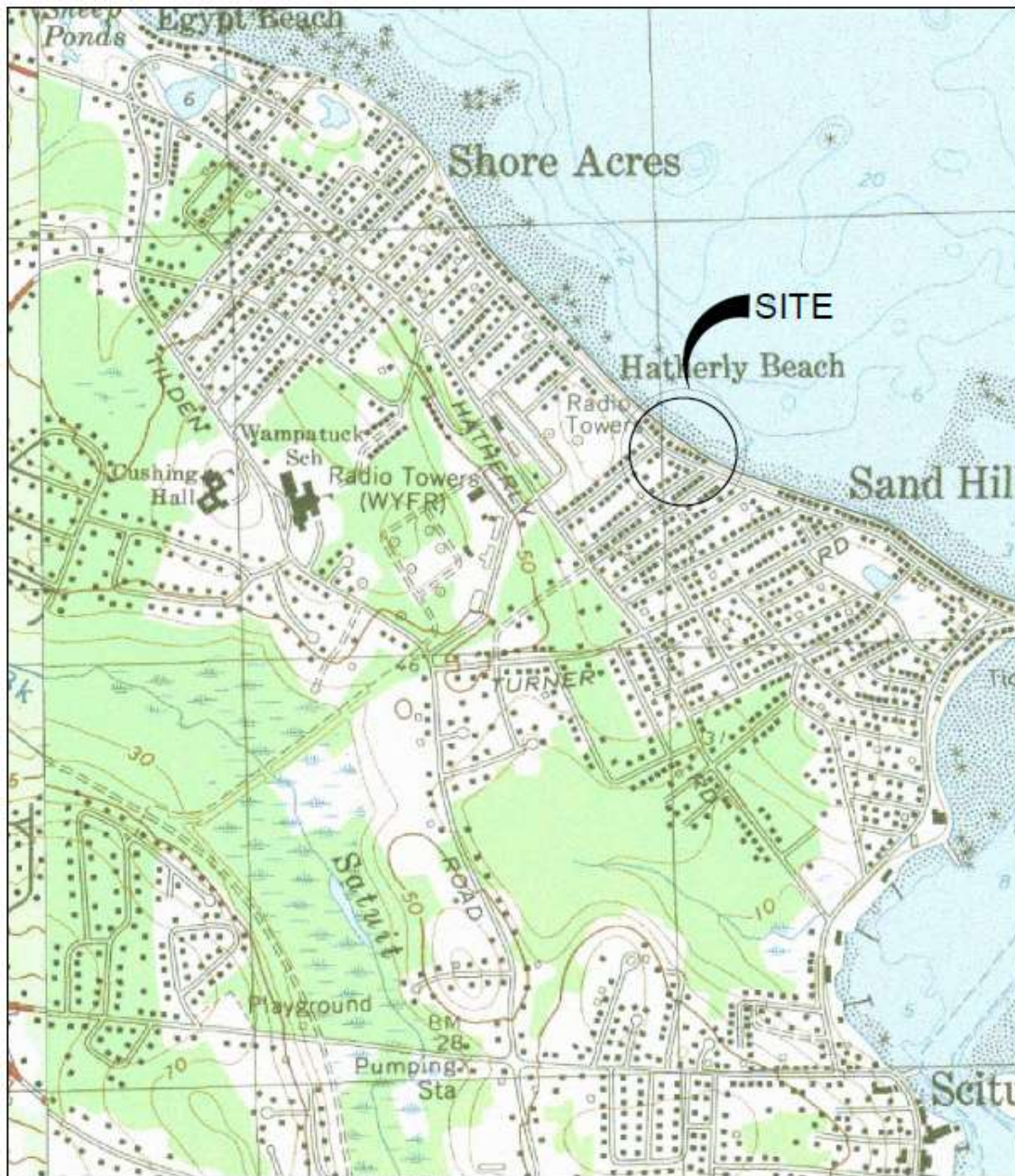
The proposed rehabilitation project will consist of the reconstruction of approximately ± 650 feet of the existing seawall as well as the reconstruction of the approximately ± 650 feet of existing stone revetment.

Seawall Rehabilitation – A new concrete seawall will be constructed within its existing authorized footprint, with the top elevation being increased approximately two (2) feet from EL 21.5 feet to EL 23.5 feet (MLW) to improve resiliency in major storm events and account for future predicted sea level rise. Provisions for dissipation of wave overwash will provide shoreline protection to existing public and private infrastructure during storm events.

Revetment Rehabilitation - The existing stone revetment will be reconstructed within its existing authorized footprint to provide protection along the base of the seawall during storm events. Existing stone, if suitable, will be utilized as part of the core of the replacement structure.

Prior to execution of the contract with EEA, the Town was required to secure a 10-foot wide easement on either side of the foot and/or toe seawall, whichever provides the greatest access. The 10-foot easement ensures ongoing public access to the top of the structure as well as access for the Town to the entire structure for reconstruction purposes as well as future ongoing maintenance of the splashpad, seawall, toe, and revetment. Easements were signed by each property owner and the contract signed in June of 2015. The contract was signed by the town and executed by EEA immediately thereafter.

Project Cost: \$6,415,461
Funds Requested from EEA: \$4,000,000
Funds Awarded: \$2,000,000 in grant
\$2,000,000 in loan
Other Funding: \$2,415,461 from the Town of Scituate
Anticipated Project Completion: November 2017



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| SITE LOCATION MAP | U.S.G.S. QUADRANGLE: | cleengineering 15 Creek Road Marion, Massachusetts 02738 t: 508.748.0937 www.cleengineering.com |
| LOCATION SCITUATE, MASSACHUSETTS | APPROX. SCALE: 1:1,000 | |
| CLIENT TOWN OF SCITUATE - DPW |  | |

Applicant: Tri-Town Water District
Project Title: Great Pond Lower Reservoir Dam Rehabilitation
Location: Great Pond Lower Reservoir, Braintree MA
Repair or Removal: Repair

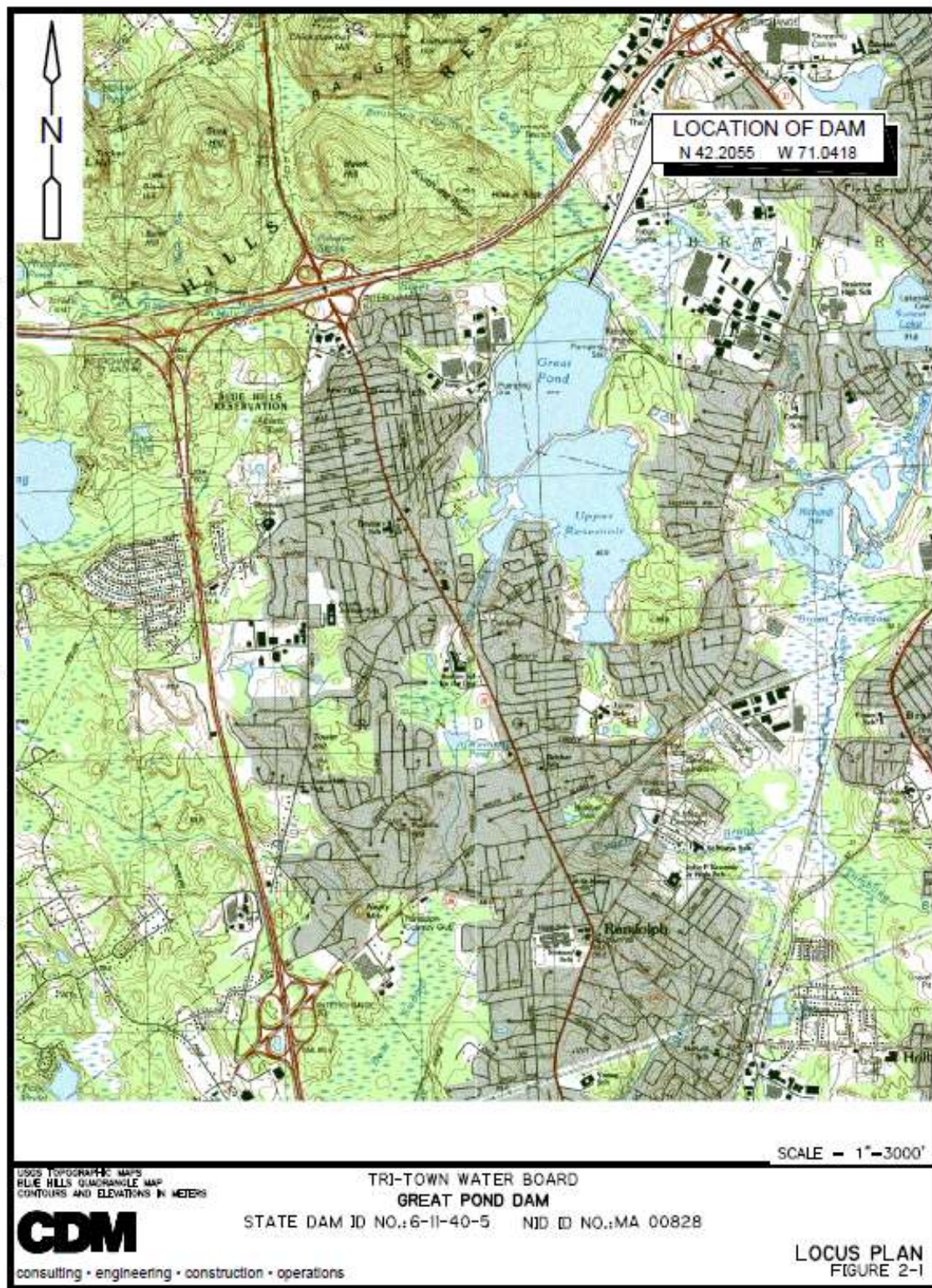
Description: The Great Pond Dam (MA00828) is located in the Town of Braintree, Norfolk County, Massachusetts. Great Pond is located just southeast of the Interstate 93-Route 28 connection and east of the Blue Hills Reservation. The reservoir created by the impoundment of Great Pond is part of four public water supply reservoirs within the Weymouth/Weir River Basin that serve the towns of Braintree, Randolph and Holbrook and it is one of four water supply reservoirs which service the customers of the Tri-Town Water District.

The Tri-Town Water Board received an Order to conduct a Dam Safety Phase I Inspection due to the poor condition of the Great Pond Dam. The Phase I Inspection/Investigation Report, completed in April 2009 noted that although most of the dam components were judged to be in fair condition, the overall condition of the dam was rated as “poor” based on deficiencies of the spillway and embankment conditions due to physical damage, design, and maintenance.

The objective of this project is to improve the dam’s stability and improve the factor of safety associated with the dam to pass design storm flows. Planned activities include: 1) clearing the trees and brush on the embankment slopes, crest, and the downstream area for a distance of at least 20 feet beyond the toe of the dam. The brush around the headwall of the low-level outlet will also be removed; 2) isolated areas will be regraded to reduce the erosion of the crest; 3) low areas will be backfilled with compacted fill as necessary and establish grass growth; 4) isolated areas of riprap on the upstream slope of the dam will be repaired and sloughed; 5) any exposed section of the concrete core wall and cover final surface with riprap at the interface of the upstream slope and the crest of the dam will also be backfilled; 6) the entire length of the existing Great Pond Dam embankment would be armored on all surfaces to safely accommodate overtopping flows; 7) a fishway will be added, complementing the work being done on the nearby Monatiquot River.

Each member of the district were issued a notice to proceed in early February 2015. Project coordination will be managed by Braintree.

Project Cost: \$1,291,200
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$165,200 in grant
 \$814,671 in loan
Other Funding: \$291,200 by the Tri Town Water district member communities
 Member Communities: Braintree, Holbrook, Randolph
Anticipated Project Completion: April 2017



Indicative Project Summaries

PREVIOUS AWARDEES

Applicant: Town of Bellingham
Project Title: Old Mill Dam Removal
Location: Charles River, Bellingham
Repair or Removal: Removal

Description: The Old Mill Dam located on the Charles River in Bellingham, Massachusetts is on the Massachusetts Dam Safety Law list of 100 Critical Municipally Owned Dams. This dam is in poor condition due to severe deterioration of the concrete at the combined low level outlets and spillway structure. Additionally, the dam has also been found to have other areas of dam safety concerns including apparent sinkhole development, growth of unwanted vegetation, potential scour at the spillway toe, and the concrete and stone retaining walls are in poor condition. The Town of Bellingham has conducted studies and evaluations for both the repair and the removal of the Old Mill Dam. They have reasoned that the Old Mill Dam is an aging piece of infrastructure that provides limited purpose to justify the cost associated with continued operations and maintenance.

The removal of this dam is cost effective, in the interest of preserving public safety and is environmentally sound. As with most dams, the Old Mill Dam lacks provisions for wildlife passage. The dam and spillway provides an obstacle to habitat connectivity and fish passage and also impacts the water quality along the Charles River. The removal of this dam will reconnect more than 4 miles of stream channel along the Charles Rivers and tributary streams and rivers, providing for a great feat in ecological restoration.

This dam removal project has two phases; (1) Impoundment Area Restoration and (2) Dam Removal. The first phase entails removing and disposing of contaminated sediment, restoring the natural stream channel and vegetating areas of soil exposed by draining the impoundment and dredging. The second phase consists of the construction activities associated with the removal of the dam as well as the gradation of slopes. This was awarded \$500,000 through the Dam and Seawall Repair and Removal Fund.

While a contract was awarded in August of 2014, the loan is not expected to be executed until late 2015. This project is also a priority project of DFG's Division of Ecological Restoration (DER). DER is providing technical assistance. The design and permit tasks are moving forward, though sediment management issues have slowed progress.

Project Cost: \$1,000,000
Funds Requested from EEA: \$500,000
Funds Awarded \$188,000 in grant
\$312,000 in loan
Other Funding: N/A
Anticipated Project Completion: Summer 2016



Applicant: Town of Brookfield
Project Title: Saw Mill Pond Dam Design
Location: Saw Mill Pond Dam, Brookfield MA
Repair or Removal: Repair

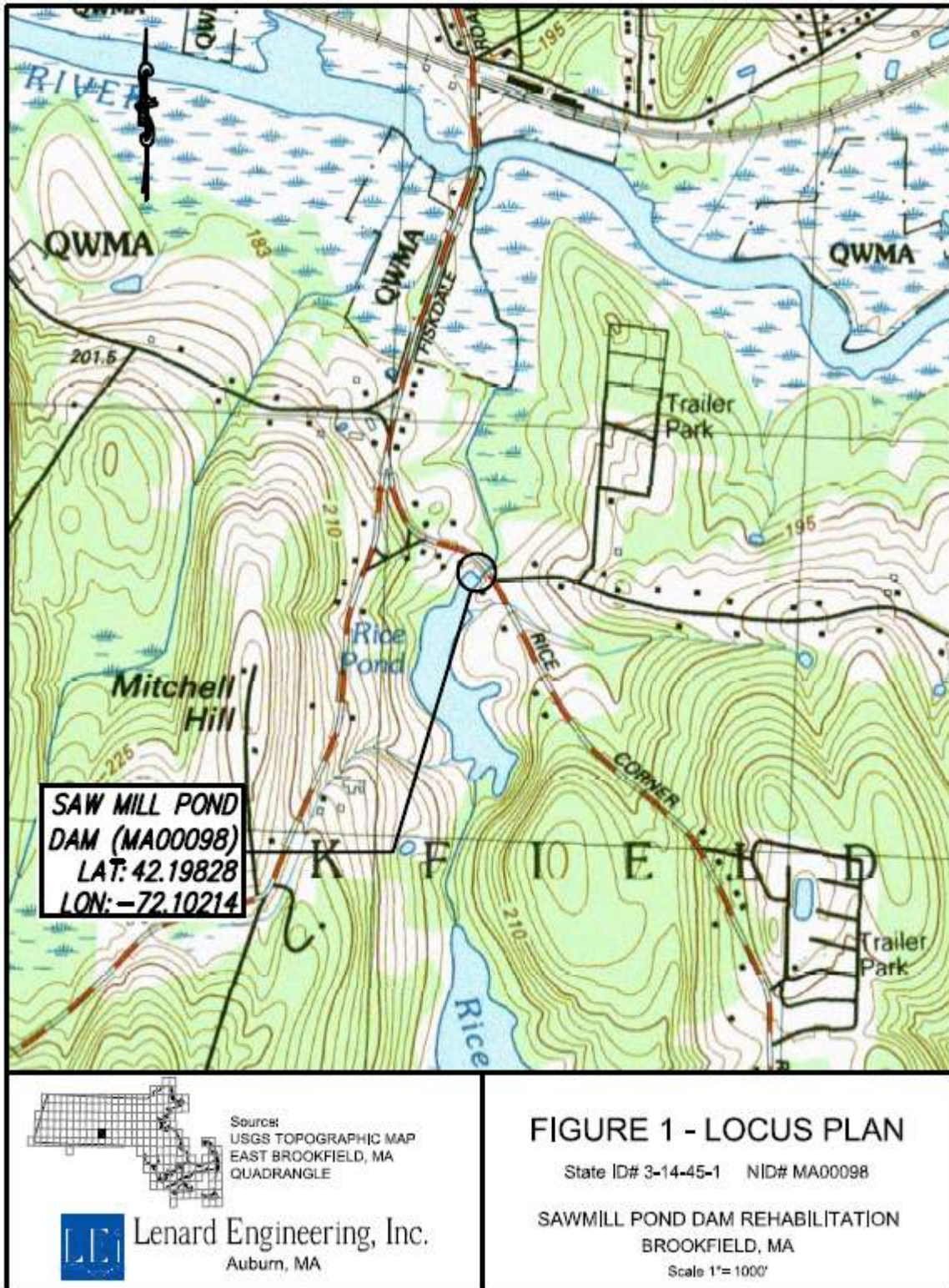
Description: The Saw Mill Pond Dam, as inspected and deemed by the MA DCR Office of Dam and Safety, does not meet accepted safety standards and is a potential threat to public safety. This dam has a lack of visible low level outlet control, deterioration of the exposed low level conduit, the presence of dense woody vegetation on the downstream slope, steep downstream channel slopes, a deteriorated left downstream stone masonry training wall, undulations on the left downstream shoulder, and a sinkhole on the right upstream shoulder over a deteriorated roadway drainage pipe. Leakage was also observed through the abutment weep holes along the spillway channel. The dam crest consists of the public way of Lake Road; should a breach of the dam occur, the safety of citizens living in residences located on Lake Road as well as downstream would be jeopardized.

The Saw Mill Pond Dam Repair Project is designed to address the safety issues of the dam; namely the lack of a functional low level outlet, undulations and failing masonry walls in the downstream slopes, and sinkholes developing along the crest's downstream left shoulder. The repairs outlined in this project will address the concerns of MA DCR Office of Dam and Safety, these repairs include: removing the current inoperable inlet control and exposed portions of the low level conduit; installing an upstream sluice gate and operations platform; the downstream deficiencies will be repaired by extending the downstream abutment wing walls, removing the deficient left downstream training wall, and re-grading and restoring grass on both downstream slopes from the channel to the shoulders near the spillway; vegetation on the downstream slope will be removed; sinkholes along the crest will be excavated and properly backfilled and graded for positive drainage in preparation of the repairs.

The implementation of the proposed repairs will result in a reduction of the current public safety issues. The installation of a new low level outlet works will allow for greater control of the impoundment water level and increased safety for the upstream residents. The installation of the catch basins and curbing along Lake Road will reduce direct runoff from the roadway into the impoundment and downstream areas, providing environmental improvement.

EEA finalized the contract on 1 July 2014. The Army Corps of Engineers issued their permit in the spring of 2015, completing the permit process. With the design work finished, the construction bond was signed by the Town and EEA in late June.

Project Cost: \$246,561
Funds Requested from EEA: \$179,949
Funds Awarded: \$6,750 in grant
 \$173,199 in loan
Other Funding: \$66,942 Town of Brookfield
Anticipated Project Completion: December 2015



Applicant: Town of Canton
Project Title: Shepard Pond Dam Repairs & Upgrades
Location: Shepard Pond, Canton, MA
Repair or Removal: Repair

Description: Originally constructed in the 1880's for mill power, the Shepard Pond Dam now serves as a pond for recreation and wetland preservation. This dam, classified as a significant hazard dam as well as structurally deficient and in poor condition by the MA DCR Office of Dam and Safety, seeks repairs and upgrades that will transition the dam into a modern engineered structure, significantly improving public safety and greatly enhancing resilience in the face of climate change.

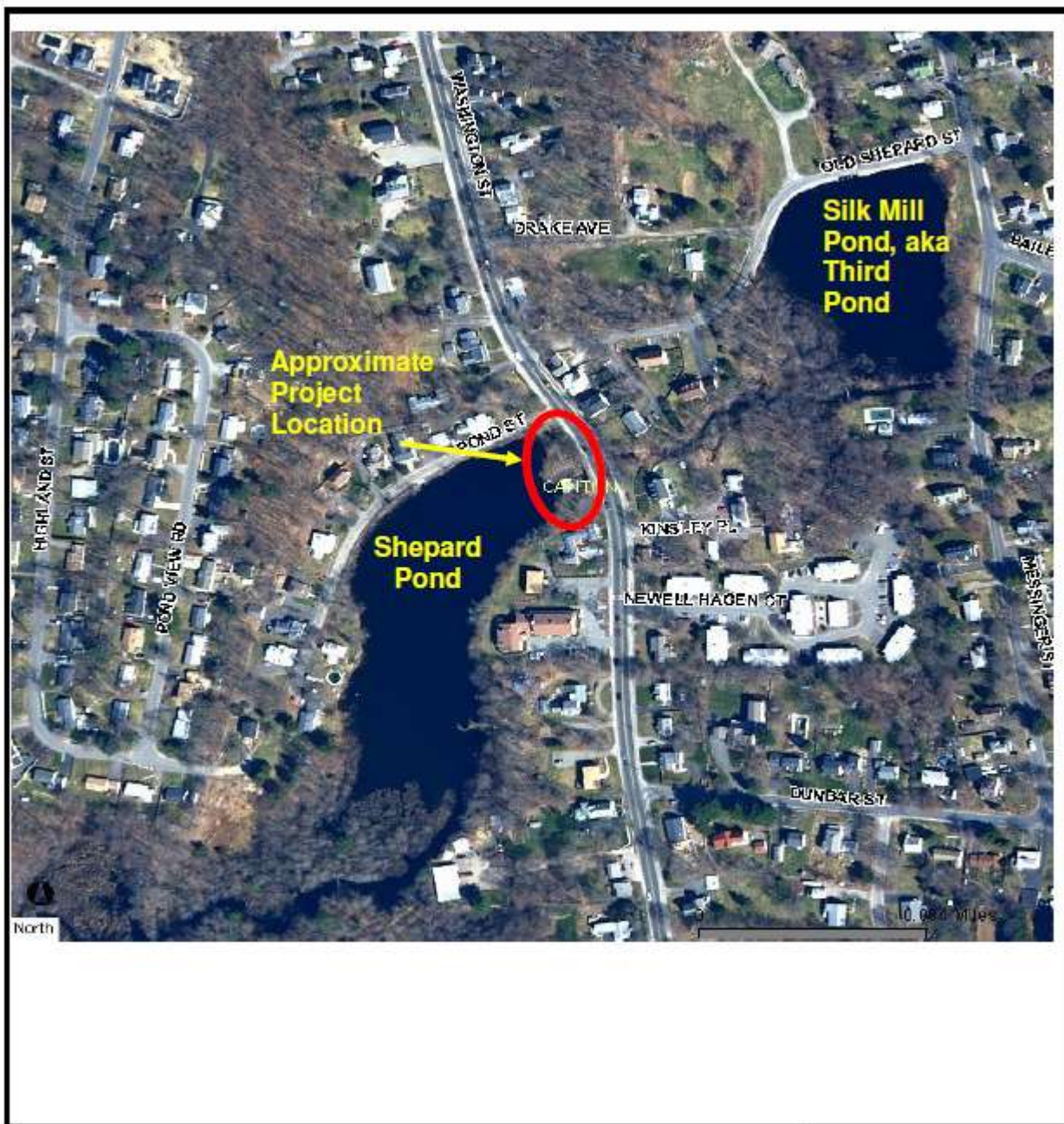
The Shepard Pond Dam had major structural and hydraulic deficiencies that jeopardize dam safety and, consequently, public safety. These deficiencies include internal erosion and severely inadequate hydraulic capacity that result in overtopping the dam during periods of minimal flooding. These deficiencies significantly increase risks of dam failure, risking loss of life, private property and public infrastructure damage to about 80 residential and commercial downstream structures, Washington Street, utilities (water, sewer, gas, electric), Old Shepard Street Dam and five other streets. Failure of the water main on Washington Street as a result of Dam failure would leave 800 homes, an assisted living facility, and strip-malls and other commercial properties stranded without water for drinking or fire suppression as well as without emergency vehicle access. Additionally, the Shepard Pond Dam is plagued by invasive species plants such as the Japanese Knotweed, Purple Loosestrife, and Oriental Bittersweet. These invasive species threaten native and naturally occurring plants. The approved project will reinforce public safety while improving the ecology of the Dam.

The overall project goals are to reduce risk of loss of life and property damage (protect public safety) and to preserve the pond by mitigating risk of internal erosion and voids via engineering testing and repairs, making hydraulic and structural repairs and improvements to address overtopping, sinkholes and internal erosion, and removing invasive vegetation.

With contract signed 26 March 2014 and final design completed, the construction loan was signed in March of 2015. Significant progress has been made in completing this project.

Project Cost: \$2,000,000
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$665,000 in grant
 \$335,000 in loan
Other Funding: \$1,000,000 Town of Canton
Anticipated Project Completion: December 2015





Applicant: Town of Fall River
Project Title: Rattle Snake Dam Removal Project
Location: Rattle Snake Brook, Freetown, MA
Repair or Removal: Removal

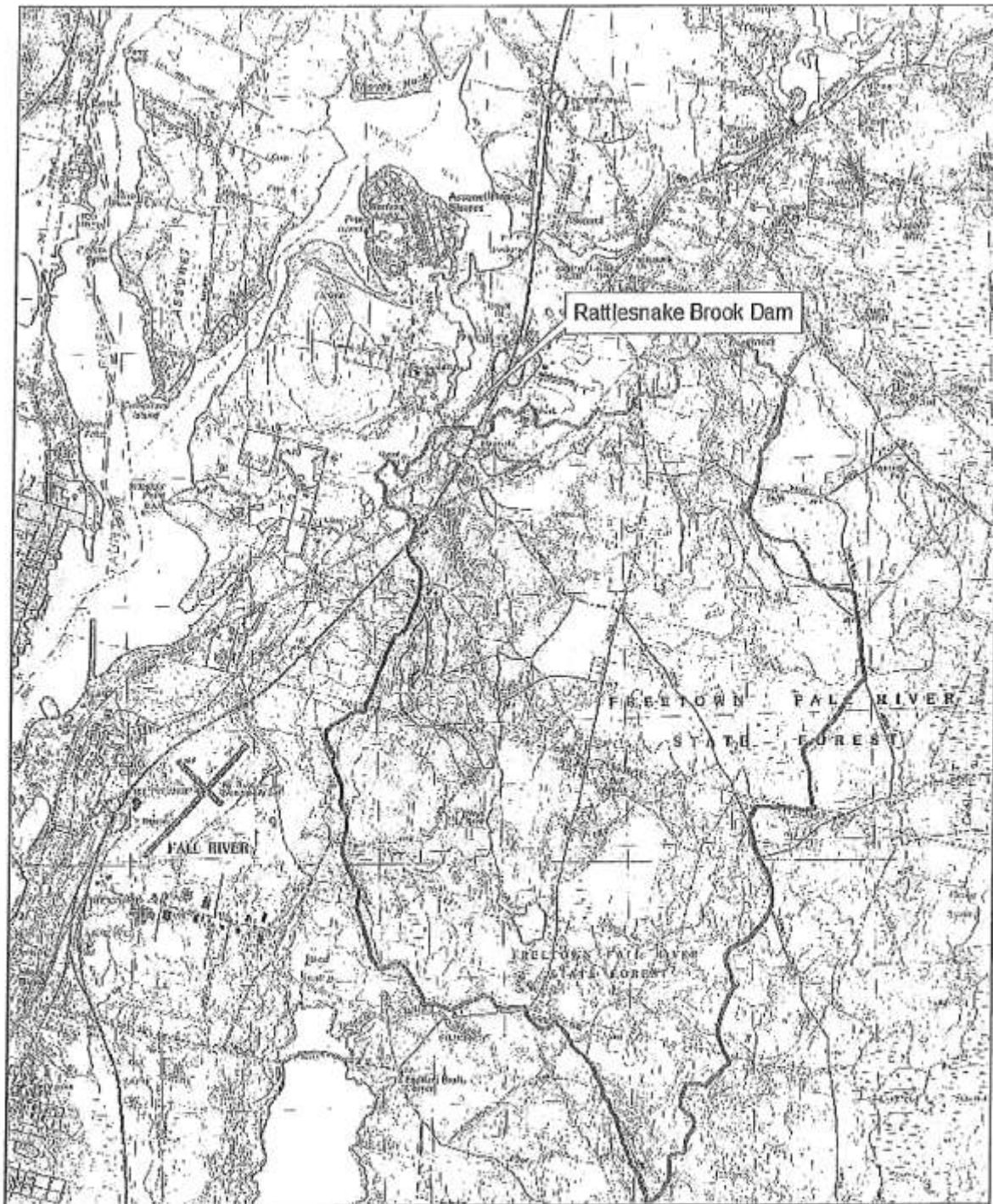
Description: A 2009 inspection of the Rattle Snake Dam found that the dam was in unsafe condition with a partially breached spillway at the right abutment and a partial breach of the embankment at the left abutment. The dam has extensive growth of large trees throughout the dam; there are areas of accumulated debris which compromises water quality; and, there's erosion and leakage at the primary spillway. Based upon the observations, the dam is not functioning as designed and has the potential for accelerated deterioration.

Given that the dam impounds water for no formal purpose aside from passive recreation and the minimal available freeboards provide little flood attenuation, breaching of the dam was determined the most practical and viable option to addressing safety and stability concerns.

The removal of this dam has many environmental benefits. The proximity of the project dam to the marine environment presents an opportunity to restore riverine habitat and access for diadromous species, including sea run brook trout, American eel, and river herring. Rattlesnake Brook is designated as a coldwater stream by the Commonwealth of Massachusetts Department of Fish and Game Division of Fisheries and Wildlife (DFW) in its upper reaches and DFW stocks the stream with brook trout (*Salvelinus fontinalis*). Currently, the Rattlesnake Brook Dam acts as a barrier to upstream fish passage so this removal will restore the ecological and aquatic habitat, flora and fauna to how it is intended to be.

This contract, finalized in March of 2014, provided financial support to complete the design and permit phase of the project. A recent award by the US Department of the Interior will fund the actual dam removal through a contract managed by the Massachusetts Division of Ecological Restoration. Removal of the structure in the spring of 2016 is anticipated.

Project Cost: \$343,000
Funds Requested from EEA: \$46,474
Funds Awarded: \$46,474 in grant
Other Funding: \$10,000 The Nature Conservancy
 \$403 Mass Division of Ecological Restoration
Anticipated Project Completion: December 2014



Legend

 Rattlesnake Brook Dam Watershed

0 325 650 1,300 1,950 2,600 Meters



Applicant: City of Gloucester
Project Title: Babson Reservoir Dam Rehabilitation
Location: Babson Reservoir Dam, Gloucester
Repair or Removal: Repair

Description: Constructed in the 1930's, The Babson Reservoir Dam serves as the water supply system for the City of Gloucester. Failing a 2006 visual inspection, the Dam was declared as poor condition status. In conjunction with the poor condition of the dam, a Gloucester Housing Authority elderly housing complex and residential neighborhood are located in the immediate downstream floodway, classifying this dam as a high hazard structure.

Additionally, making repairs to the Babson Reservoir Dam helps meet the requirements for the local Conservation Commission, MassDEP, and associated impacts to adjacent bordering vegetated wetlands around and upstream of the reservoir.

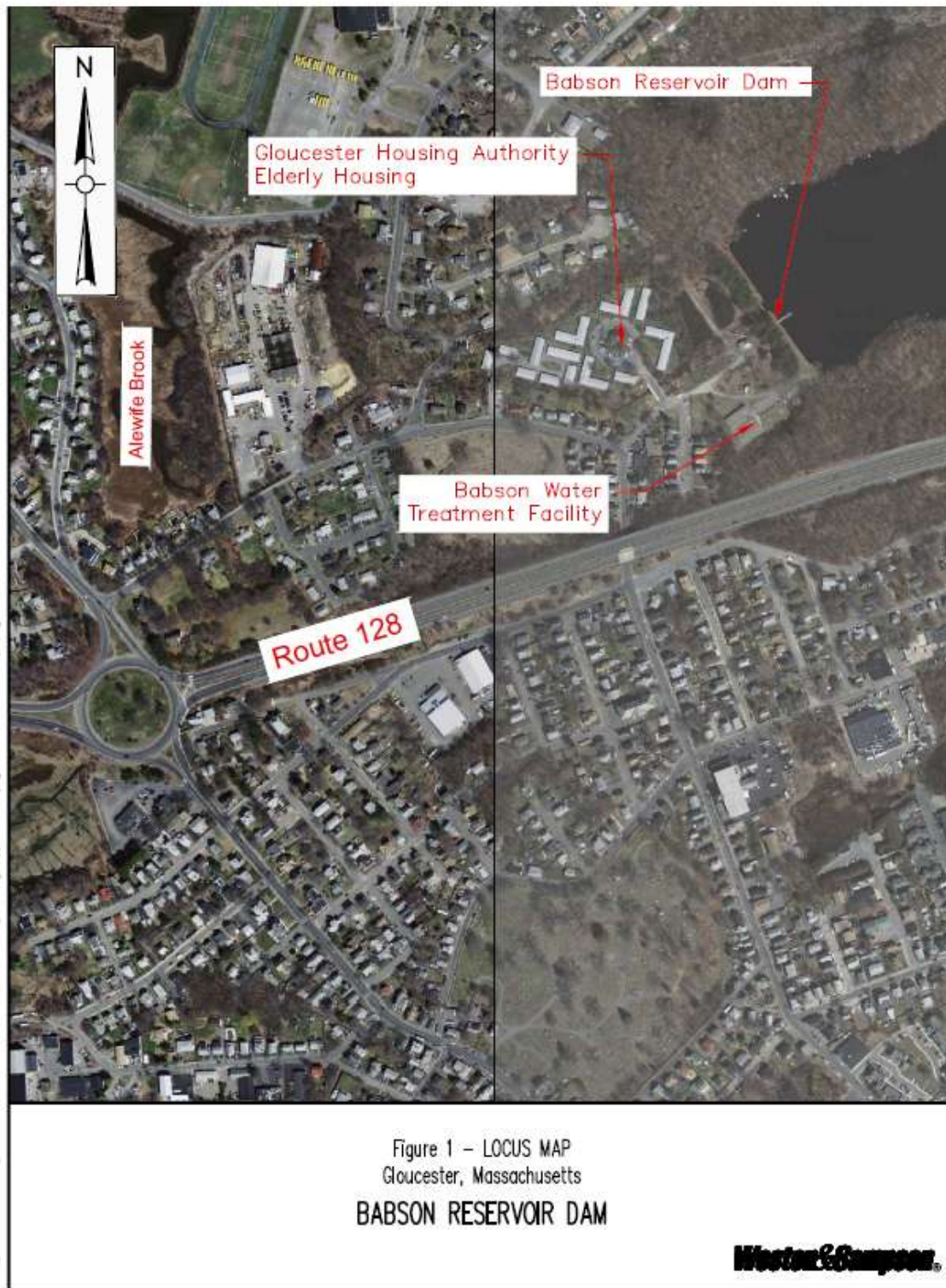
This Dam rehabilitation project was awarded \$1,000,000.00 in the form of both a grant (\$146,000.00) and loan (\$845,000.00). The existing chute spillway was replaced with a new reinforced concrete baffled chute spillway. The spillway baffles are designed to dissipate the energy of the Spillway Design Flood (SDF) peak discharge to limit potential damage to features downstream of the dam. The concrete core wall was raised to provide freeboard above the peak SDF stage in the reservoir. Concrete surfaces of the existing gatehouse were repaired as well as the protective concrete slab on the upstream slope of the embankment. The downstream embankment slopes were cleared and grubbed of woody vegetation and root mass. The slopes were graded for more slope stability and a mineral drainage filter will be incorporated into the downstream slope to help manage seepage throughout the dam.

All permits have been issued and significant progress has been made in the construction phase. At the request of the City, construction loan execution has been postponed until the fall of 2015.



Before and after stages of the Gatehouse

Project Cost: \$1,377,000
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$146,000 in grant
 \$845,000 in loan
Other Funding: \$300,000 City of Gloucester Department of Public Works
Anticipated Project Completion: November 2014



Applicant: Town of Hull
Project Title: Stoney Beach Seawall Construction
Location: Stoney Beach Seawall, Hull
Repair or Removal: Repair

Description: Built in 1934, the Stoney Beach Seawall, located within a FEMA VE 100 year flood Velocity Zone according to the most recent Flood Insurance Rate Maps, has seen repairs in 1979, 1989, 1992 and 2011. Recent storm damage, in particular from Superstorm Sandy and the two blizzards that occurred in February 2013, have resulted in the accelerated/critical deterioration of the coastal protection structures, which has resulted in MA DCR condemning the structure. It is noted that as part of the proposed project, the top elevation of the existing seawall will be increased from El. 8.5 feet to El. 12.5 feet (NGVD29) to account for future sea level rise.

The Stoney Beach Seawall provides protection to the Town's Wastewater Treatment Plant, residential homes and Nantasket Avenue. Nantasket Avenue serves as the sole connector from Hull Village and Pemberton point to the rest of Hull and Massachusetts. If Nantasket Avenue were to be compromised, this loss of access would prevent emergency vehicles from serving over 400 homes, the Jacobs Elementary School, Hull High School, the Point Allerton Coast Guard Station, Fort Revere Park, the Hull Village Cemetery and the Hull Public Library. Additionally, the Wastewater Treatment Plant, which receives influent from over 5,000 residencies, is located less than 200 feet from this wall; failure of the force main and/or flooding of the Treatment Plant could result in significant environmental damage and health hazards due to the discharge of large volumes of untreated sewage.

This project will provide a modern shape that will better adapt to wave and storm action, facilitating in the protection of Hull's residents and critical infrastructure. One portion of this wall has deteriorated less than the other portions; in the area where the revetment remains intact, the wall will be repaired by removing and resetting the armor stone to restore the foreslope to a smooth face with a 1:5:1 slope. The remaining, deteriorated portion of the wall will be reconstructed. Existing armor stone will be removed to allow the installation of a new base stone and filter fabric, and then the armor stone will be replaced as necessary to construct the wall to modern design standards.

The contract was signed in April 2014. The Juno storm in January caused a slight delay in the rock quarry's ability to provide needed armor stone. The project will be successfully completed in early July 2015.

Project Cost: \$3,000,000
Funds Requested from EEA: \$3,000,000
Funds Awarded: \$2,750,000 in grant
Other Funding: N/A
Anticipated Project Completion: June 2015



Applicant: Town of Lancaster
Project Title: Wekepeke Brook Restoration – Bartlett Pond
Location: Robert Frommer Conservation Area, Lancaster, MA
Repair or Removal: Removal

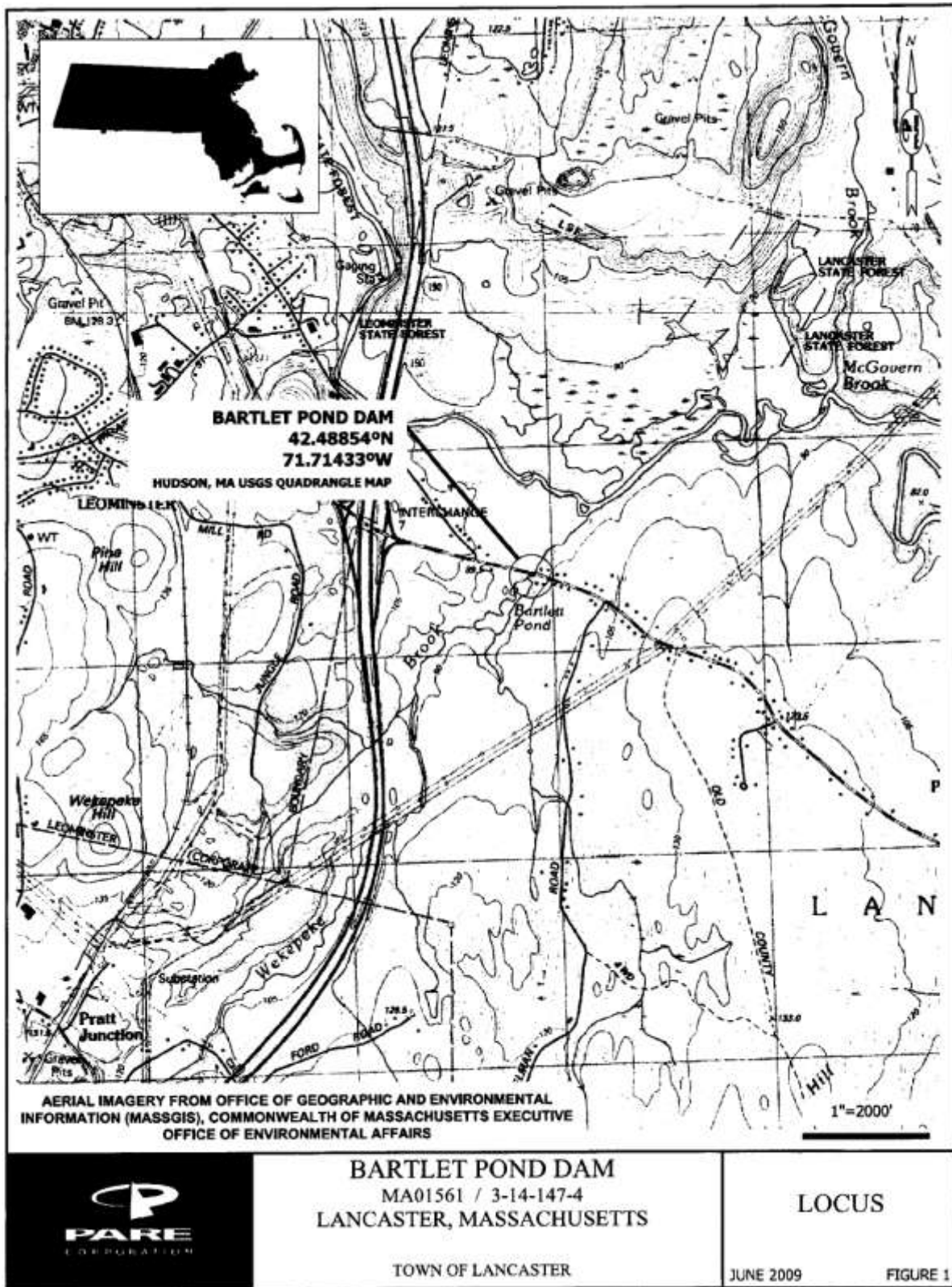
Description: Originally, the Bartlett Pond Dam was constructed to supply power to the Bartlett Chair Factory. The Factory was never rebuilt after being destroyed by a fire, making this dam obsolete. The dam was in poor condition due to significant deterioration of concrete, breached portions along the spillway, leakage through the right abutment, and growth of unwanted large trees and vegetation. Massachusetts Department of Conservation and Recreation had classified this dam as a significant hazard potential dam, causing loss of life and damage of homes, industrial or commercial facilities, secondary highways or railroads if the dam were to fail. Considering there is no more need for this dam, the Town of Lancaster removed the dam with the assistance of the Division of Ecological Restoration and EEA.

In addition to reinforcing public safety, the dam removal has made a significant positive ecological impact on the Nashua River and Wekepeke Brook. The Wekepeke Brook is a quality cold-water stream with native brook trout, a mapped BioMap Core Aquatic Habitat, and a wetland core habitat located in the watershed. The Bartlett Dam is located at the outlet to the watershed, and interrupts the movement of organisms, sediment, and organic matter to the Nashua River immediately downstream. Within weeks, upstream fish passage was witnessed. Improved water quality and restoration of river processes helped to restore the site to a healthy aquatic habitat.

Project Cost: \$202,000
Funds Requested from EEA: \$116,000
Funds Awarded: \$116,000 in loan
Other Funding: \$56,000 Town of Lancaster
 \$30,000 Mass Division of Ecological Restoration
Anticipated Project Completion: June 2014

Removal of the dam on Wekepeke Brook in 2014 brought immediate environmental benefits to the area and created a serene setting for the community to enjoy.





Applicant: Town of Marshfield
Project Title: Hewitts Point Seawall Revetment Repair
Location: Marshfield, Massachusetts
Repair or Removal: Repair

Description: The existing seawall at Hewitt's Point was originally constructed before 1940 and is now in need of stabilization and repair. This seawall has seen repairs in 1945 and 1956; in 1956 a grouted riprap revetment outshore of the seawall with steel sheetpiles at the toe was added. This grouted riprap revetment has since been repaired numerous times but is now badly deteriorating and becoming undermined. The undermining is causing sinkholes to open in the riprap which poses a safety hazard to beach users, and will impact the seawall's stability during storm conditions which endangers the functionality of the seawall. The seawall is the final line of defense preventing waves from washing away the adjacent roadway or damaging dense residential areas immediately inshore of the roadway. This roadway is the primary access through the area connecting two communities and also serves as an evacuation route during storms and supports water, sewer, gas electricity and telephone lines.

The proposed reconstructed revetment would completely remove the existing grouted riprap and sheetpiles, and replace it with a placed armor stone revetment. The reconstructed revetment would be at a finished slope of 1 vertical to 2 horizontal and would consist of a filter fabric layer with graded stone layers placed over the top. Individual armor stone size has been assumed to be 8 to 9 tons to allow some factor of safety for the single layer of armor. The grading of the stone is designed to avoid the loss of underlying stone in the future.

Wall stability is also a concern and the proposed cross section will add a concrete toe as required to ensure full support of the existing wall at the toe. The sinkholes behind the wall will be addressed by excavating to a depth of approximately 8 feet behind the wall, placing a geotextile against the wall and backfilling using the existing material. This will minimize future migration of fine material and reduce risk of formation of sinkholes.

Marshfield was issued a notice to proceed in June of 2014. The project was completed on time, despite some interim damage incurred by the Juno storm of January 2015.

Project Cost: \$1,591,800
Funds Requested from EEA: \$506,000
Funds Awarded: \$488,000 in grant
Other Funding: \$29,960 Town of Marshfield
Anticipated Project Completion: Fall 2014



Applicant: City of Northampton
Project Title: Upper Roberts Meadow Reservoir Dam Removal
Location: Village of Leeds, Northampton, Massachusetts
Repair or Removal: Removal

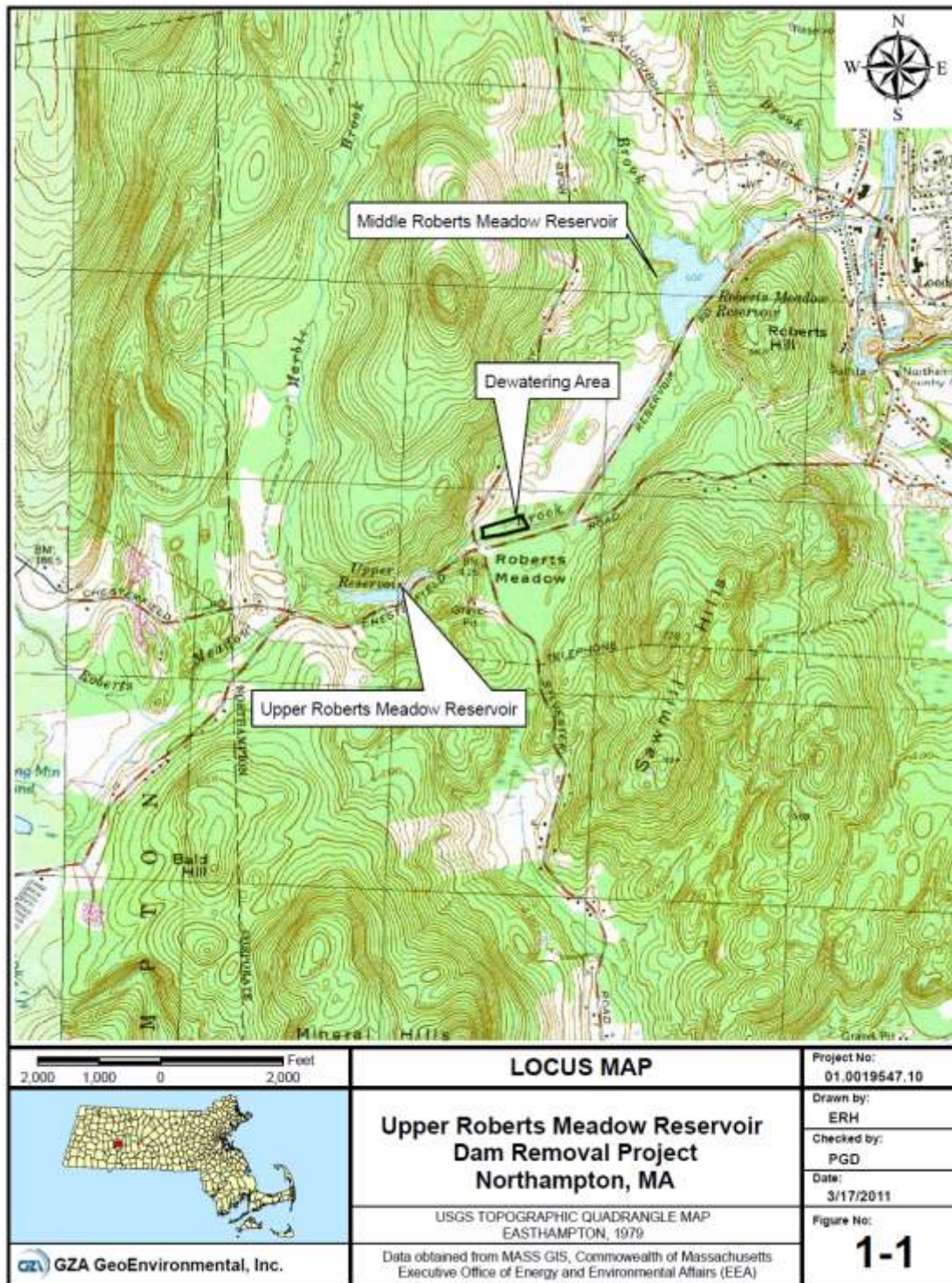
Description: Constructed in 1883, the Upper Roberts Meadow Reservoir Dam originally was meant to be part of the City's water supply system. Currently, the Upper Roberts Meadow Reservoir has no capacity or potential to provide water supply, even on an emergency basis. Therefore, the dam currently serves no purpose relative to the water supply.

In addition to this dam being obsolete, it has been rated as poor and unsafe since the 1970's by the Massachusetts Department of Public Works due to the significant leakage through the dam, embankment, and abutments. The structure additionally does not meet current design standards relative to structural stability and hydraulic capacity.

The removal of this dam and restoration of the reservoir basin will allow an obsolete structure to provide a multitude of long-term benefits to local resources. The long term benefits include: restoration of connectivity of Robert Meadow Brook to allow migration of brook trout and other aquatic organisms from the lower segmented portion of the brook to the upper reaches of the brook; restoration of natural flow patterns; reestablishment of natural sediment and nutrient transport; improvement of water quality; and enhancement of habitat value and long-term sustainable benefits for aquatic organisms.

This contract, executed in March of 2014, provided to assist in the completion of the design work which has been completed.

Project Cost: \$236,000
Funds Requested from EEA: \$75,000
Funds Awarded: \$75,000 in grant
Other Funding: \$161,000 from the City of Northampton
Anticipated Project Completion: Early 2015



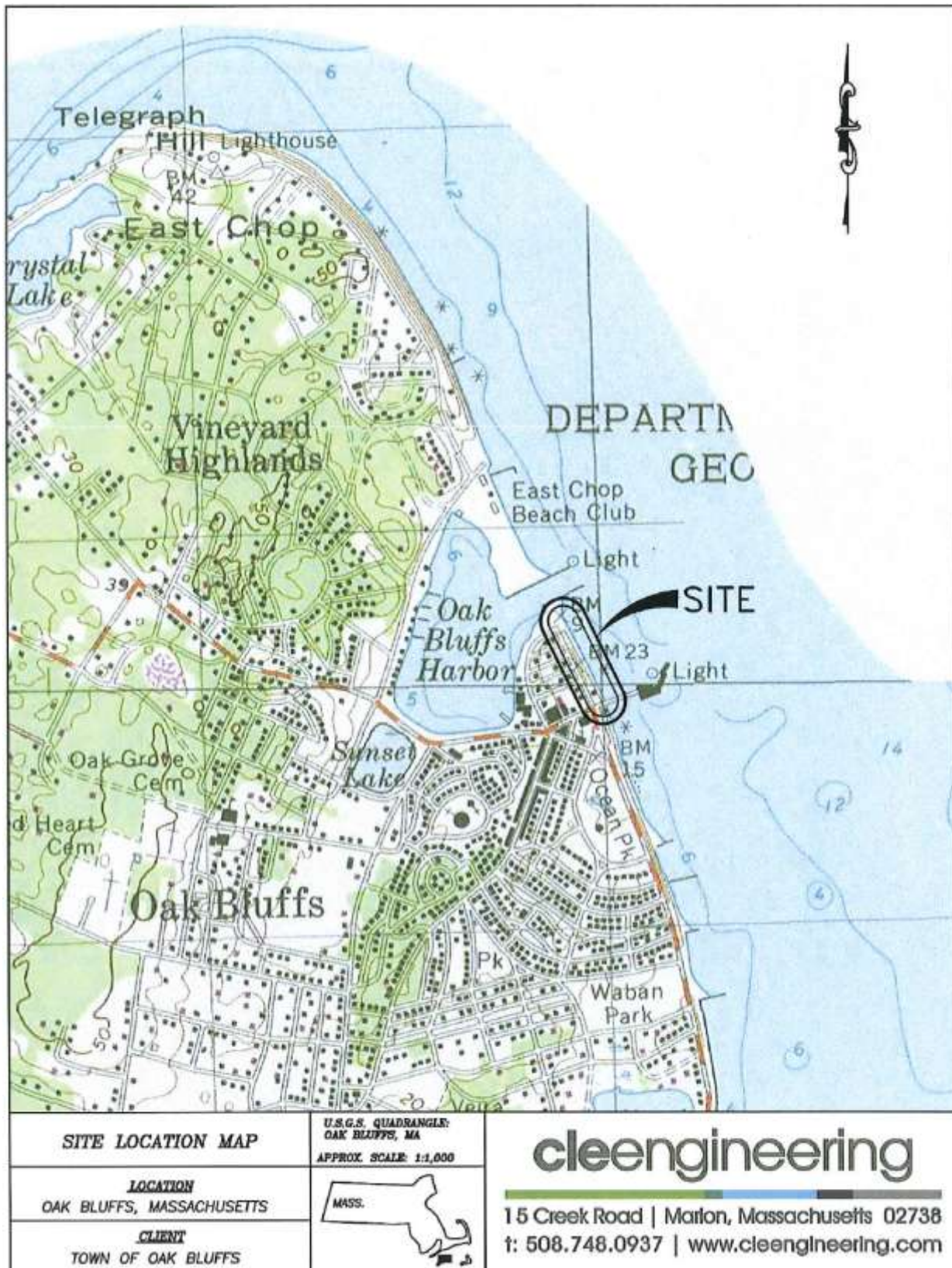
Applicant: Oak Bluffs
Project Title: North Bluff Seawall Rehabilitation Project
Location: Town of Oak Bluffs, Massachusetts
Repair or Removal: Repair

Description: The existing North Bluff Seawall, which consists of a concrete seawall, stone revetment and unarmored coastal bank, extends approximately 720 linear feet along Sea View Avenue Extension. This shoreline structure provides protection to the public roadway and associated utilities as well as adjacent private properties. Sea View Avenue Extension ties into Sea View Avenue and collectively this public access way provides a direct conduit to the waterfront which supports commercial ferry service, commercial, recreational and transient boaters, fishermen, beach goers, bicyclists, swimmers, rowers, walkers and hundreds of thousands of annual visitors/tourists. All of the aforementioned activities prove to be vital components for generating revenue for the Town as well as private businesses situated along the waterfront and within the downtown area.

Any present and/or future storm event and/or loading condition along the roadway could cause additional failure of the Coastal Bank, and by extension, the collapse of the roadway. The proposed project plan has been developed such that it is consistent with maintenance practices that have been implemented at this site by the Town and State since the 1930s. Recent storm damage, in particular from Superstorm Sandy and the two blizzards that occurred in February 2013, have resulted in the accelerated/critical deterioration of the coastal protection structures, which has resulted in MA DCR condemning the structure. It is noted that as part of the proposed project, the top elevation of the existing seawall will be increased from El. 8.5 feet to El. 12.5 feet (NGVD29) to account for future sea level rise.

EEA finalized their contract with Oak Bluffs in April of 2014. Shortly thereafter, anticipated financial support from FEMA was withdrawn unexpectedly. EEA and DCR's Office of Waterways has worked with the community to redesign the project. The project has restarted with no additional funding required by EEA.

Project Cost: \$6,000,000
Funds Requested from EEA: \$4,000,000
Funds Awarded: \$3,600,000 in grant
Other Funding: N/A
Anticipated Project Completion: late 2016



Applicant: Town of Plymouth
Project Title: Plymco Dam Removal, Town Brook
Location: Plymouth, Massachusetts
Repair or Removal: Removal

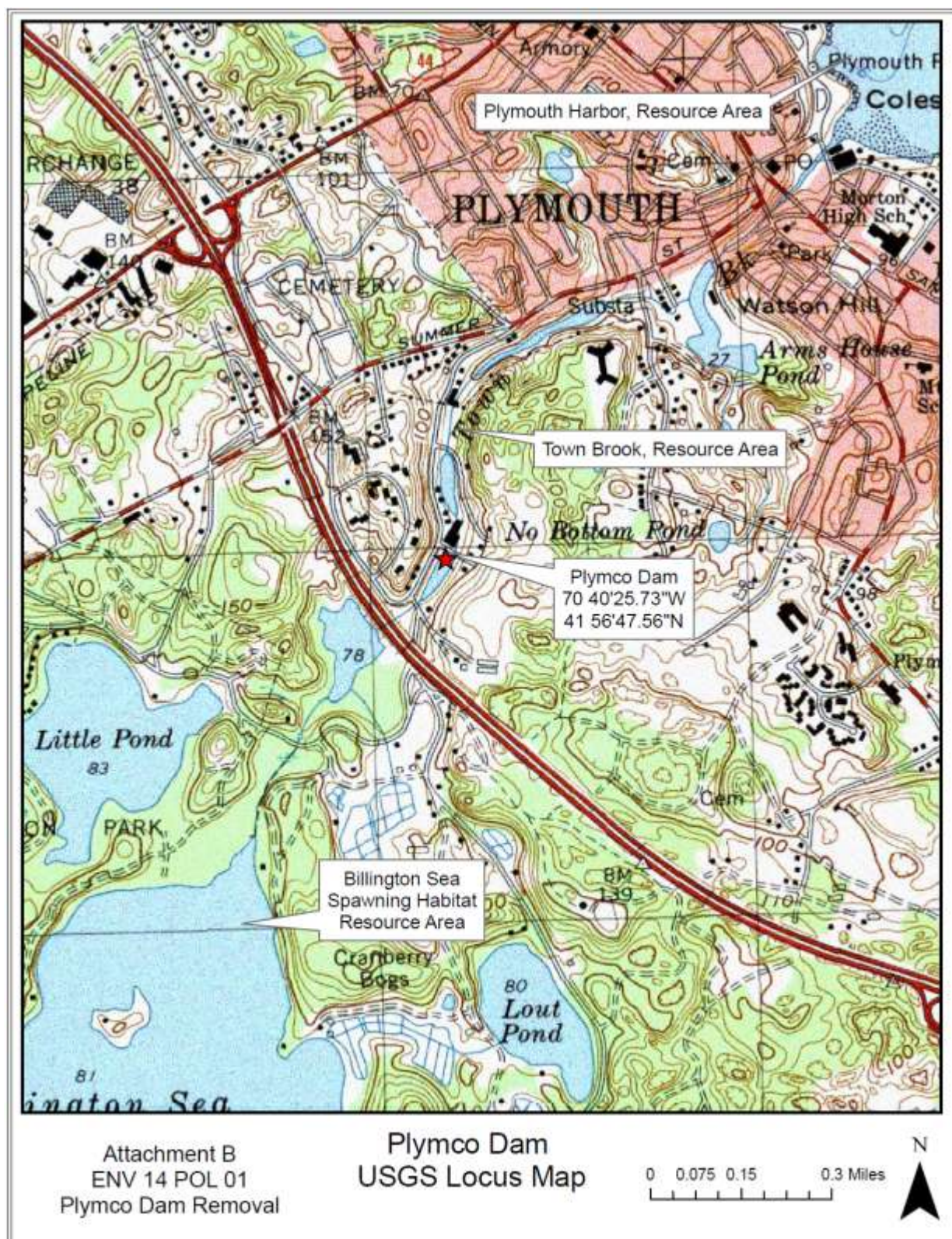
Description: The removal of the Plymco Dam is an important component of a comprehensive interagency initiative to restore Town Brook and is also on the Massachusetts Division of Ecological Restoration's list of priority restoration projects. The Plymco Dam as well as other historic dams in the area along Town Brook has significantly degraded fish passage and impacted ecological processes in the local river system.

As a result of removing dams along Town Brook, including the Plymco Dam, over 1.5 miles of river will be opened for fish passage including restoring access to Billington Sea, a 269-acre pond that supports critical spawning habitat for NOAA Trust Resources. Fish passage at the sites will be restored via the dam removal along with improvements to floodplain connectivity, riparian wetland habitat and water quality.

With the full removal of the Plymco Dam and the restoration of natural flow, temperature, and sediment transport processes, the habitat is expected to revert to a self-sustaining condition. This will include the establishment of a natural streambed with pools and riffles and the restoration of forested riparian habitat, both of which will contribute to channel development that will provide shade, cover, food and habitat for all life stages of resident and migratory fish species. The removal of the dam will also increase public safety by removing safety hazards associated with the high hazard dams and eliminate maintenance costs.

With the signing of the contract in August of 2014, design and permit work ensued. In June 2015 the bond was executed providing the portion of the construction funds needed. The Massachusetts Division of Ecological Restoration contributed technical assistance as well as funding.

Project Cost: \$1,671,743
Funds Requested from EEA: \$730,743
Funds Awarded: \$730,743 in loan
Other Funding: \$114,000 American Rivers Association
\$525,000 NOAA
\$302,000 Division of Ecological Restoration
Anticipated Project Completion: Early 2016



Applicant: Town of Rockport
Project Title: Pigeon Cove Break Water Repairs
Location: Sandy Bay, Rockport, Massachusetts
Repair or Removal: Repair

Description: Pigeon Cove is located in Rockport, Massachusetts along Sandy Bay. It is a protected harbor that is home to Pigeon Cove Fisherman's Co-Op as well as recreational boating. Two breakwater structures provide protection to the cove and the adjacent residential and commercial properties. The granite stone, land connected upper breakwater is approximately 1,000 feet long by 15 feet high with 1:1 side slopes on both sides, providing easterly shelter from the Atlantic Ocean. The breakwater extends down to the riprap slope on the east side to the ocean and down to an access road for the Co-Op on the west side. The granite block, entrance break water is approximately 320 feet long by 15+ feet high and provides the cove with shelter from waves from the southeast.

Damage to these structures was sustained during the period of strong storm surge from March 12 – April 26, 2010. Near the outer one-third of the upper breakwater, the crest of the breakwater was compromised with loss of armor stone on the ocean side slope. At the entrance breakwater, damage consisted of unraveling at its mid-section and both ends. Before the Town could repair these structures, they were further damaged by the February 2013 Blizzard. The partial loss of armor stone increased to a breach in the structure and there are now 9 additional zones with signs of damage consisting of loss of armor stone and altered slope.

Repairs will include reconstructing the breached portion of the breakwater and resetting and replacing granite stones and base material at other damaged areas. Reconstruction and repair of the breakwaters will re-establish and potentially improve the level of protection from storm events and associated waves. These structures provide protection to Pigeon Cove, the Pigeon Cove Fisherman's Co-Op operations and livelihood, the adjacent properties, and the Town's roadway and infrastructure systems. Provisions will be made to incorporate projected sea level rise, climate change effects, and the preliminary revisions for the FEMA flood insurance rate maps.

Project Cost: \$1,250,000
Funds Requested from EEA: \$14,000
Funds Awarded: \$14,000 in grant
Other Funding: \$1,150,000 from FEMA and local funds
Anticipated Project Completion: Late 2014

Applicant: Town of Wareham
Project Title: Parker Mills Pond Dam Rehabilitation
Location: Wareham, Massachusetts
Repair or Removal: Repair

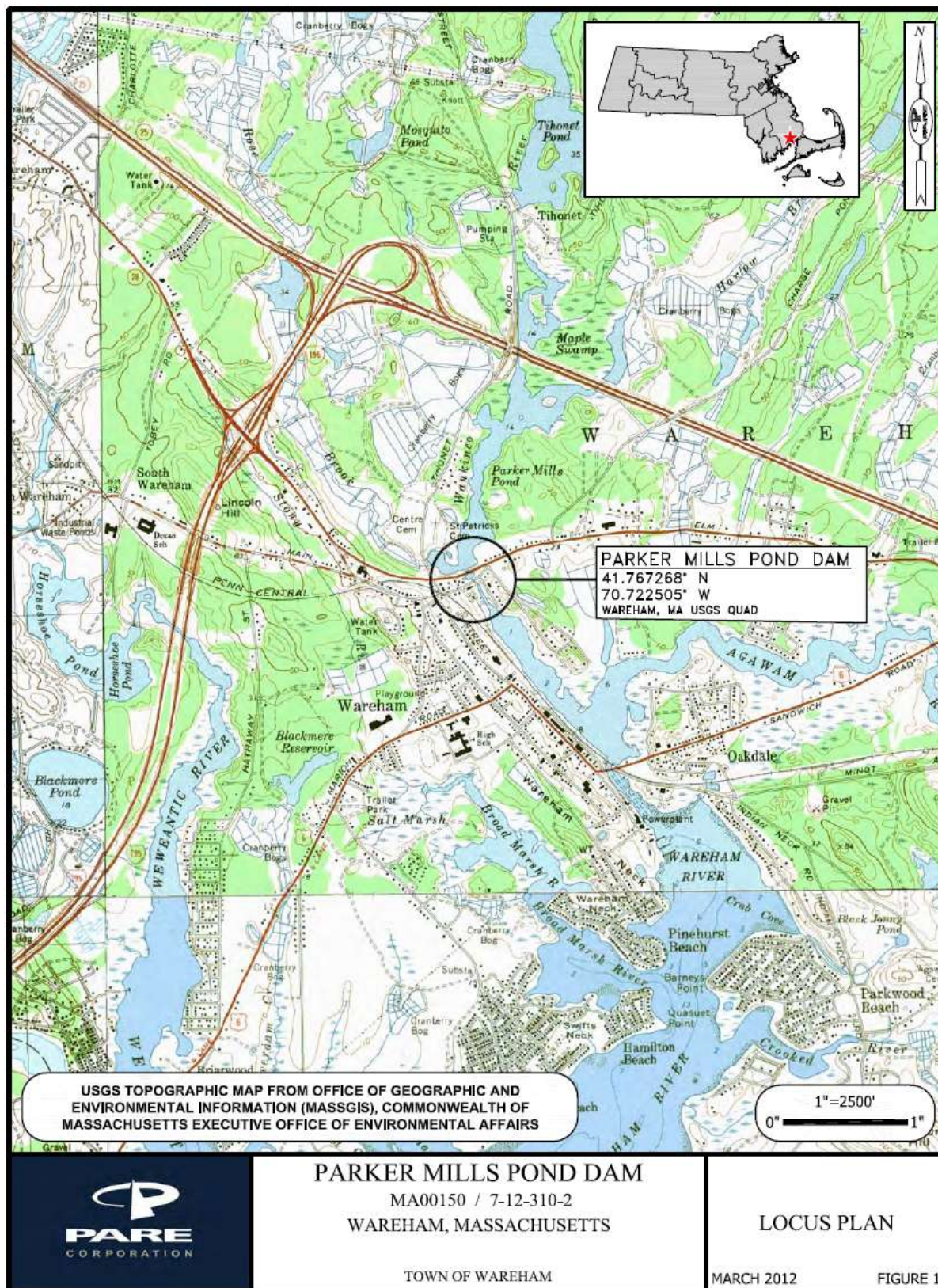
Description: The Parker Mills Dam faces a multitude of necessary repairs in order to maintain public safety. Recent inspection of the dam has found the dam to be in poor condition with displaced and unstable upstream wall sections, sinkholes and leakage along the mill building intake system, deterioration of concrete and construction joints at the auxiliary spillway, deterioration of concrete at the primary spillway, large tree and vegetation growth along the dike embankment, stump and brush growth within the upstream stone wall, and several depressions along the back of the upstream wall.

This Dam has high hazard potential due to the risk of potential damage to more than 80 residential properties, damage to more than 12 residential and secondary roadways, and risk of loss of life due to inundation of these areas. Failure of the dam would also impact the Tremont National Historic District, a site that has been previously identified as a top 10 endangered resource.

This rehabilitation project includes developing a monitoring program, undertaking required maintenance activities including clearing trees and unwanted vegetation as well as repairing leaks and cracks in the auxiliary spillway/fish ladder walls, reconstructing the upstream wall, and removing the existing mill building intake culverts amongst other improvements.

As of June 2015 a contract has not been executed. Historic documents have recently surfaced which have called into question the ownership of the structure.

Project Cost: \$1,200,000 – \$2,000,000
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$164,995 in grant
\$835,005 in loan
Other Funding: \$200,000 Town of Wareham
Anticipated Project Completion: Early Spring 2015



Applicant: City of Westfield
Project Title: Granville Reservoir Dam Repair Project
Location: Westfield, Massachusetts
Repair or Removal: Repair

Description: During Tropical Storm Irene in 2011, discharges from the dam's spillway exceeded 3 feet in depth, resulting in high flow and velocity down the spillway discharge channel. This super elevation in water surface overtopped a portion of the channel causing the dam to fail. While emergency repairs were done then, the Granville Reservoir Dam still needed substantial repair.

The Granville Reservoir serves as a primary public water supply for the City of Westfield and provides water to approximately 50% of the population. Seeing that this Dam is vital in supporting its community as well as being classified with high hazard potential, it is paramount for public safety that this dam seeks repair. The repairs include replacement of the curved section of the spillway channel including the failed portion. Other repairs and improvements included: flattening the downstream slope; raising the dam's spillway training walls; regarding low areas of the dam's crest; replacing embankment stormwater collection infrastructure; clearing woody vegetation; installing filter blankets on down steam slope; and repaving the roadway on the dam's crest, amongst other repairs.

Repair of the spillway and improvements to the dam improve the structure and operation of the dam, as well as minimize the potential for failure. If failure of the dam were to occur again, more than 2,600 properties would be impacted and the City would lose its primary drinking water source.

The contract was signed in June of 2014. The construction loan was executed shortly thereafter. Work on the dam and the spillway has been completed.

Project Cost: \$3,452,400
Funds Requested from EEA: \$1,000,000
Funds Awarded: \$1,000,000 in loan
Other Funding: N/A
Anticipated Project Completion: September 2014

After performing emergency repairs to the spillway in 2011, it was decided the best strategy was to completely remove the structure and replace it.





Applicant: City of Worcester
Project Title: Poor Farm Pond Dam Removal
Location: Poor Farm Brook, Shrewsbury, Massachusetts
Repair or Removal: Removal

Description: The Poor Farm Pond Dam was constructed in the early 1800's likely for irrigation of the home farm adjacent to the dam. The removal of this obsolete dam is both cost-effective and ecologically sound. This aged dam is judged to be in poor condition due to severe erosion of right abutment as well as other areas of erosion, several trees and stumps throughout the embankment, damaged riprap spillway apron, cracked or deteriorated concrete features, and failure of downstream end of right masonry training wall. The Poor Farm Pond Dam also acts as a barrier to the movement of fish and other aquatic species by interrupting the migration or resident species to upstream spawning and nursery habitat. Removal of the existing dam will transform the existing slow moving water body to a flowing stream with improved water quality and lower water temperatures.

The removal process would result in a natural 14-foot wide channel that promotes fish and other aquatic life health and is equipped to deal with a 100 year flood. The removal of the dam will restore natural fluvial processes and improve riparian habitat in the dam impoundment and the adjacent reaches of the brook, as well as increase dissolved oxygen levels downstream to Lake Quinsigamond. This project also qualifies for flow offset credit mitigation benefits for the Town of Shrewsbury under the SWMI Framework in the category of habitat improvement.

Additionally, this removal will improve the flood control and damage prevention interests of the WPA. The upstream impoundment will be replaced over time by a vegetated wetland that can moderate flow and absorb floodwaters. Dam removal also eliminates the potential risk of catastrophic dam failure resulting in uncontrolled release of floodwaters and potential downstream flooding.

The contract was signed in 2015. No work has been reported yet.

Project Cost: \$980,000
Funds Requested from EEA: \$240,000
Funds Awarded: \$240,000 in grant
Other Funding: \$740,000 City of Worcester
Anticipated Project Completion: November 2016

